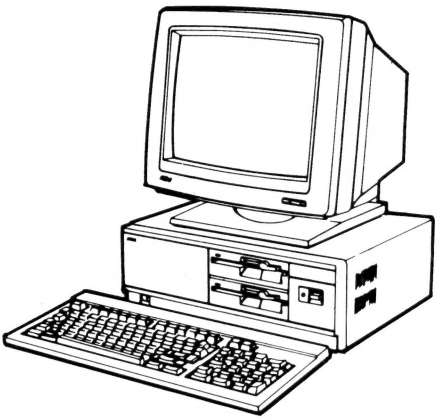
APC III



MS™-DOS User's Guide for the Software Library Expander

NEC

NEC Information Systems, Inc.

819-150258-000 Rev. 00

5-85

Important Notice

(1) All rights reserved. This manual is protected by copyright. No part of this manual may be reproduced in any form whatsoever without the written permission of the copyright owner.

(2) The policy of NEC being that of continuous product improvement, the contents of this manual are subject to change, from time to time, without notice.

(3) All efforts have been made to ensure that the contents of this manual are correct; however, should any errors be detected, NEC would greatly appreciate being informed.

(4) NEC can assume no responsibility for errors in this manual or their consequences.

SLE software is Copyright 1985© by Phoenix Software Associates Ltd.

IBM is a registered trademark of International Business Machines Corporation.

Microsoft is a registered trademark of Microsoft Corporation.

MS is a trademark of Microsoft Corporation.

Copyright 1985©

NEC Information Systems, Inc.
1414 Mass. Ave.
Boxborough, MA 01719

Printed in U.S.A.

Contents

Page

Preface xi

Chapter 1 Introduction

Overview 1-1
MS-DOS 1-1
SLE Mode 1-2
Specialized Mode 1-3
Hardware Requirements 1-4
System Memory 1-4
Color Graphics Board 1-4
How to Use this Guide 1-5
Conventions Used in this Guide 1-6
Release Bulletin 1-6

Chapter 2 System Start-up and Maintenance

Installing the SLE Board 2-1
Powering-on the System 2-1
Loading the SLE MS-DOS System Diskette 2-2
Entering Time and Date 2-2
Running Applications 2-4
Color Graphics Board 2-5
Installing Application Software 2-5
Special Cases — Non-MS-DOS Software 2-5
READ.ME File 2-6
Exiting from SLE Mode 2-6
Managing System Resources 2-6
Automatic Reloading of the Command Processor 2-6
Software Maintenance Procedures 2-8
Backing Up the SLE Diskettes 2-8

Contents

Page

Formatting a Diskette on a Dual-Drive System 2-8
Copying the SLE MS-DOS System Diskette on a Dual-Drive System 2-9
Backing Up the SLE MS-DOS System Diskette on a Single-Drive System 2-10
Formatting and Copying Diskettes on a Single-Drive System 2-11
Booting and Loading 2-11
Making a Bootable Diskette 2-11

Chapter 3 Using the APC III Keyboard

Overview 3-1
MS-DOS Software Library Expander Template 3-3
Keypad Template 3-4
Inactive Keys 3-5
Special Key Functions 3-5
Shift Key Priorities and Combinations 3-6
Special Key Combinations 3-7
Line Feed 3-7
System Reset 3-7
Print Screen 3-7
Break 3-7
Pause 3-8
Echo to Printer 3-8
Command Line Template Editing Keys 3-8

Chapter 4 Hard Disk Setup

Using the Hard Disk in SLE Mode 4-1
Setting Up the Hard Disk 4-2

Contents

Page

Disk Drive Designators 4-2
Partition Summary 4-2
Disk Preparation Summary 4-5
Initializing the Hard Disk (HDSETUP Format Option) 4-5
Formatting a Section of a Hard Disk 4-7
Partitioning the Hard Disk (HDSETUP Create Option) 4-9
Using Create to Define a Single MS-DOS Partition 4-9
Using Create to Define Several MS-DOS Partitions 4-10
Partitioning the Hard Disk for More Than One Operating System 4-13
PC-UX Note 4-16
Activating the MS-DOS Partition (HDSETUP Active Option) 4-17
Formatting the Partition for MS-DOS (MS-DOS FORMAT Command) 4-19
Deleting an MS-DOS Partition (HDSETUP Delete Option) ... 4-19
Selecting the Hard Disk Unit (HDSETUP Select Option) 4-20
Booting from the Hard Disk 4-20
Booting from Diskette 4-21

Chapter 5 SLE MS-DOS Utilities

Overview 5-1
Device Name Differences in SLE Mode 5-3
Information Common to All MS-DOS Commands 5-3
Utility Formats 5-4
How to Enter MS-DOS Commands 5-5
SLE MS-DOS Utilities Descriptions 5-9
ASSIGN 5-9
xASSIGN 5-10

Contents

Page

BACKUP 5-13
BOOT 5-15
CHMOD 5-16
COMP 5-19
DISKCOMP 5-21
DISKCOPY 5-22
FORMAT 5-24
GRAPHICS 5-26
HDSETUP 5-27
MODE 5-28
RESTORE 5-32
RETRACT 5-33
SIZE 5-34
TREE 5-36
xTREE 5-37

Appendix A APC III Hardware

Microprocessor Unit (MPU) A-1
Diskette Drives A-1
Hard Disk Drives A-1
RS-232C Serial Communications Interface A-2
8087 Numeric Data Coprocessor A-2
Boards A-3
- SLE Board A-3
- Color Graphics Board A-3
- Unsupported Boards A-3
- PC-UX Memory Management Board A-3

Contents

Page

Appendix B CRT Display

Text B-1
CRT Displayed Character Set B-1
Graphics B-2

Appendix C ANSI.SYS

Cursor Control C-4
Cursor Position C-4
Cursor Up C-4
Cursor Down C-5
Cursor Forward C-5
Cursor Backward C-6
Horizontal and Vertical Position C-6
Device Status Report C-7
Cursor Position Report C-7
Save Cursor Position C-7
Restore Cursor Position C-8
Erasing C-9
Erase in Display C-9
Erase in Line C-9
Mode of Operation C-10
Set Graphics Rendition C-10
Set Mode C-11
Reset Mode C-11
Keyboard Key Reassignment C-12

Appendix D RAMDISK

Figures

Figure	Title	Page
1-1	Hardware/Software Relationships	1-2
3-1	APC III Keyboard with the Keypad Template and the MS-DOS Software Library Expander Template	3-2
5-1	Disk Directory and File Structure	5-38
B-1	APC III Displayable Character Set	B-2

Screens

Screen	Title	Page
4-1	Partition Table	4-6
4-2	Partition Table with a 1238-Track Partition	4-10
4-3	Partition Table with a 600-Track Partition	4-12
4-4	Partition Table Listing Three Partitions	4-13
4-5	Partition Table Listing a 500-Track Partition	4-14
4-6	Partition Table Listing MS-DOS and OTHER Partitions	4-15
4-7	Partition Table Listing Non-Contiguous PC-UX Partitions	4-16
4-8	Partition Table Listing BOBSDOS as Active	4-18

Screens

Screen	Title	Page
5-1	xASSIGN Display	5-12
5-2	CHMOD Display	5-18
5-3	SIZE Display of .COM Files	5-34
5-4	SIZE Display of All Files on Drive B	5-35
5-5	xTREE Display from Root Directory	5-39
5-6	xTREE Display from \BIN Directory	5-39
5-7	xTREE Display of .TXT Files	5-40

Tables

Table	Title	Page
3-1	MS-DOS Software Library Expander Template Key Functions	3-3
3-2	Keypad Template Key Functions	3-4
3-3	Command Line Template Editing Key Functions	3-8
4-1	Partition Summary	4-4
4-2	Hard Disk Track Summary	4-4
5-1	SLE MS-DOS Utility Summaries	5-2

Preface

The NEC Software Library Expander (SLE) is a combination of hardware and software that enables the APC III to run the industry-standard versions of many of the most popular *application* programs. This manual explains how to run programs with the SLE, and describes the MS-DOS commands and utilities specific to this mode of MS-DOS on the APC III.

For general information about MS-DOS, see the *MS-DOS User's Guide*.

Chapter 1

Introduction

OVERVIEW

The NEC Software Library Expander (SLE) package consists of the SLE board and the SLE MS™-DOS software. With the SLE board installed and SLE MS-DOS software loaded, the NEC APC III can run the *industry-standard* versions of many of the most popular *application* programs; hence the name Software Library Expander.

MS-DOS

MS-DOS is the operating system used on the APC III with the Software Library Expander. An *operating system* is a group of programs that controls the computer's operations. For instance, MS-DOS allocates memory for running programs, and places data on, and retrieves data from, storage devices. *Storage devices* may be diskettes or hard disks. Figure 1-1 outlines the hardware and software relationships among the operating system, application programs, and the APC III.

MS is a trademark of Microsoft Corporation.

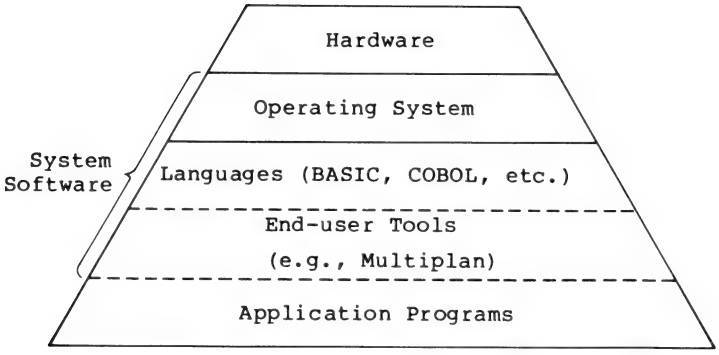


Figure 1-1 Hardware/Software Relationships

Two versions of MS-DOS have been customized for use with the APC III. *SLE mode* MS-DOS, which is provided on the SLE MS-DOS system diskette, can only be run with the SLE board installed in the APC III. The other version of MS-DOS, which is provided with the system unit, runs with or without the SLE board installed. This version of MS-DOS is referred to as *Specialized mode*.

SLE Mode

SLE mode enhances the versatility of the APC III by greatly increasing the number of programs that can run on the computer. To run the APC III in SLE mode, the SLE board must first be installed. Then with the power turned on, SLE MS-DOS must be loaded. The SLE MS-DOS system diskette contains the version of MS-DOS to be used with the SLE board. In SLE mode, the APC III can run many popular application programs.

CAUTION

SLE MS-DOS can only be run when the SLE board is installed.

The SLE MS-DOS system diskette should only be used with the SLE board installed.

Specialized Mode

Specialized mode MS-DOS on the APC III runs NEC-specific programs and utilities. Specialized mode MS-DOS is unaffected by the SLE board. It is not necessary to remove the SLE board to run Specialized mode MS-DOS. See the *MS-DOS User's Guide* and the *APC III Supplement to MS-DOS User's Guide* for information about using Specialized mode on the APC III.

HARDWARE REQUIREMENTS

System Memory

The APC III comes with 128K of memory. The Software Library Expander uses approximately 64K of the total memory. At least 256K of memory is needed to run most applications.

Additional memory requirements depend on the software you want to run. Total memory should be at least 64K larger than the size recommended in the instructions of the application program. For example, if the instructions in the manual of a software package say that 192K of memory is required, you should have at least 256K of memory in the APC III (192K + 64K = 256K).

You can add memory to the APC III in increments of 128K.

NOTE

The first 64K of memory used by the Software Library Expander is invisible to the user. For example, the total memory reported by the CHKDSK utility will be 64K less than total memory physically installed in the APC III.

Color Graphics Board

The APC III comes with monochrome graphics. However, to take advantage of all of the SLE's graphics capabilities, you must install the Color Graphics board in the APC III. The Color Graphics board provides access to software employing the standard 320 × 200 color graphics resolution.

HOW TO USE THIS GUIDE

Although you may be familiar with another version of MS-DOS, refer to this guide for information specific to using MS-DOS on the APC III with the Software Library Expander, and for the operating-system-level commands and utilities designed for SLE mode on the APC III.

The guide is divided into five chapters and four appendices.

Chapter 1, "Introduction," gives an overview of the Software Library Expander, its hardware requirements, and the conventions used in this guide.

Chapter 2, "System Start-up and Maintenance," tells you how to start up the APC III with the Software Library Expander, how to run programs, and how to back up your SLE diskettes.

Chapter 3, "Using the APC III Keyboard," describes the functions of the APC III keys when used with the Software Library Expander.

Chapter 4, "Hard Disk Setup," provides necessary information for intializing and maintaining hard disk storage space.

Chapter 5, "SLE MS-DOS Utilities," describes the operating system utilities customized for use with the Software Library Expander on the APC III.

Appendix A, "APC III Hardware," provides an overview of the NEC APC III hardware relevant to the Software Library Expander.

Appendix B, "CRT Display," describes the graphics capabilities when using the APC III with the SLE, and illustrates the displayable character set for the APC III.

Appendix C, "ANSI.SYS," describes the ANSI standard screen functions provided by this installable driver..

Appendix D, "RAMDISK," describes this device driver which uses a portion of random access memory (RAM) as a storage device.

CONVENTIONS USED IN THIS GUIDE

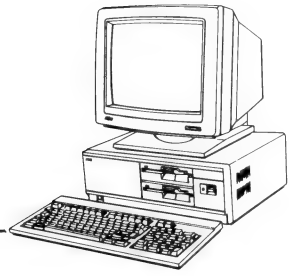
- *Press* and *type* mean to press the named key; for example, "Press **Shift**" indicates that you should press the Shift key.
- *Enter* and *entering* refer to the two-step process of typing information and then pressing the **Return** key. For example, "Enter **3**" means to type **3** and then press the **Return** key.
- Text or keys that you should enter or press are printed in **bold text**.
- To press more than one key, for instance,

  Ctrl-C

  hold down the **Ctrl** key as you press the **C** key. Do not type the dash (-).

RELEASE BULLETIN

Read the *Release Bulletin* included with your SLE MS-DOS system diskette. It contains important information that supplements, and at times, supersedes information found in this guide.



Chapter 2

System Start-Up and Maintenance

INSTALLING THE SLE BOARD

Follow the directions in the *Software Library Expander Installation Guide* to install the SLE board in the APC III. Once this is done, you can power-on the APC III and load the SLE MS-DOS system diskette.

NOTE

You must not use the Software Library Expander when the PC-UX Memory Management board is installed in your APC III. Remove the PC-UX Memory Management board before installing the SLE board in the APC III. See Appendix A, "APC III Hardware," for more information on unsupported boards.

POWERING-ON THE SYSTEM

Once the SLE board is installed, turn on the system by pressing the POWER button on the monitor and APC III base unit. Green LED power indicators will come on.

When the power comes on, the APC III automatically performs a self-check. If the self-check fails, you will hear audio alarm, or information will be displayed on the screen. If the self-check fails, follow these steps.

1. Turn off the power to the system.
2. Refer to the *APC III Owner's Guide* to verify that the system is set up correctly.
3. If the system is set up correctly and the self-check fails, contact an authorized NEC dealer for assistance.

If the self-check is successful (there is no audio alarm or display), the SLE MS-DOS system may be loaded.

LOADING THE SLE MS-DOS SYSTEM DISKETTE

Insert the SLE MS-DOS system diskette into drive A. Drive A is the top drive on a dual-drive system and the only drive on a single-drive system. (The SLE MS-DOS system diskette should only be loaded after the SLE board is installed.) Close the drive door. You will hear a clicking sound as MS-DOS is being loaded. *The SLE MS-DOS system diskette must be loaded before any software packages are run.*

NOTE

You can also boot the SLE MS-DOS system from hard disk if the SLE MS-DOS system has been installed on the hard disk. See Chapter 4, "Hard Disk Setup," for information on setting up the hard disk.

Entering Time and Date

When the SLE system is first loaded, it will ask you to enter the current date and time, using the following prompt.

```
Current date is Wed 4-10-1985
Enter new date:
```

Enter the correct date and press **Return**, or press **Return** if the displayed date is correct. The format for entering the date is mm-dd-yy (month-date-year), where

- mm is a one-or two-digit number from 1-12
- dd is a one-or two-digit number from 1-31
- yy is a two-digit number from 80-99, or a four-digit number from 1980-2099.

The numbers can be separated by hyphens (-) or slashes (/). For example, either

4-5-85 or 04/05/85

is an acceptable response to the "Enter new date:" prompt.

Once you enter a date, the system displays the prompt "Enter new time:". Enter the correct time and press **Return** or press **Return** to accept the time displayed. The format for entering the time is hh:mm (hour:minutes), where

- hh is a one- or two-digit number from 0-23
- mm is a one- or two-digit number from 0-59.

The system uses this time to keep track of when you last updated and/or created files on the system. It uses 24-hour military time; for instance, 1:30 p.m. is written 13:30.

Example:

Current time is 4:50:30:00
Enter new time: 10:44

Use a colon (:) to separate hours and minutes. (It is not necessary to enter seconds or tenths of seconds.) If you enter time in an invalid format, the following message appears.

```
Invalid time
Enter new time:
```

Enter the time in the correct format. Once you enter the date and time, the A> prompt appears. You are now ready to use the system and run a program.

For more information about the TIME and DATE utilities, see the *MS-DOS User's Guide*.

NOTE

If you need to correct a typing error *before* you press the **Return** key, use the **Back Space** key to erase one letter at a time.

RUNNING APPLICATIONS

Instructions for loading software are specific to each application. Refer to the user's manual for each software package to determine its loading and operating procedure.

CAUTION

DO NOT use any utilities, commands, or programs for SLE mode in Specialized mode.

DO NOT use any utilities, commands, or programs for Specialized mode in SLE mode.

Color Graphics Board

The APC III comes with monochrome graphics. However, to take advantage of all of the SLE's graphics capabilities, you must install the Color Graphics board in the APC III. The Color Graphics board provides access to software employing the standard 320 × 200 color graphics resolution.

Installing Application Software

Some application programs must be "installed" before they can be run. Usually the installation process consists of telling the program about your particular computer configuration.

A typical question in an installation process involves the type of monitor you are using. Always respond as if the APC III in SLE mode has a color graphics monitor.

This is the correct response, even if you have a monochrome monitor on your APC III. Remember though, to run programs that make use of the 320 × 200 graphics mode, you should have the NEC Color Graphics board installed in your APC III.

See Appendix B, "CRT Display," for more information on graphics display on the APC III.

See Chapter 5 "SLE MS-DOS Utilities," for information about device names.

Special Cases — Non-MS-DOS Software

Certain software packages come on diskettes that cannot be read under MS-DOS.

To run this software on the APC III, first boot the SLE MS-DOS system.

Then, insert the diskette that contains the non-MS-DOS software into drive A. Run the software by pressing and holding the **Ctrl**, **Alt**, and **Del** keys, in that order.

READ.ME FILE

Read the READ.ME file included on your SLE MS-DOS system diskette. It contains important information that supplements, and at times supersedes, information found in this guide.

Once the SLE MS-DOS system diskette is loaded and the A> prompt appears on the screen, enter **TYPE READ.ME** and press **Return** to display the contents of the file.

EXITING FROM SLE MODE

When you have finished running a program, exit the program according to the program's manual. Then, remove all diskettes and turn off the APC III by pressing the POWER buttons. The green LED lights should go out.

MANAGING SYSTEM RESOURCES

When the SLE MS-DOS system diskette is loaded, its programs are placed in a part of memory referred to as *system memory*. From here, these programs manage the resources of your computer system: memory, the diskette and hard disk drives, the printer, the screen, keyboard, and any auxiliary devices.

The memory area not occupied by the system programs is used to hold the application running under the Software Library Expander. Working storage areas used by an application are also reserved here.

AUTOMATIC RELOADING OF THE COMMAND PROCESSOR

Once the SLE MS-DOS system diskette is loaded, its programs remain in memory until you turn off the APC III, or until you reload the operating system.

Occasionally memory requirements for executing a large program will cause MS-DOS to use the area where the command processor COMMAND.COM was loaded. (This happens without the user's knowing it.) When the program ends, MS-DOS will automatically attempt to

reload COMMAND.COM from the SLE MS-DOS system diskette. If you have removed the SLE MS-DOS system diskette from the default drive, the following message appears:

```
Insert MS-DOS diskette in default drive
and strike any key when ready
```

(The default drive is indicated by the prompt.)

Insert the SLE MS-DOS system diskette into the appropriate default drive to reload COMMAND.COM. Press any key to continue.

If you accidently insert a diskette other than the SLE MS-DOS system diskette into the default drive, the following message appears:

```
Invalid COMMAND.COM
Insert COMMAND.COM diskette into default drive
and strike any key when ready
```

Insert the SLE MS-DOS system diskette into the default drive and press any key to continue.

SOFTWARE MAINTENANCE PROCEDURES

Backing Up the SLE Diskettes

Once you have booted the SLE MS-DOS system, it is strongly recommended that you make a backup copy of the SLE diskettes. If a diskette becomes damaged, or if files are accidently erased, files may be recovered from the backup copy. This is why it is so important to back up diskettes.

Making a backup copy of a diskette requires two procedures: *formatting* a diskette, and *copying* information from the original diskette to the backup diskette.

The backup procedure can be performed on both the single-drive and dual-drive APC III systems. Instructions are given for both methods.

NOTE

You can also use these backup procedures to make a backup copy of an application program, unless specific copy protection methods are employed by the application.

Formatting a Diskette on a Dual-Drive System

The formatting process checks the diskette for defective areas and prepares it to accept data. Diskettes must be formatted before they can be used for data storage.

CAUTION

Formatting a diskette destroys all existing data on the diskette. Make sure the diskette that you are formatting is a new, unused diskette, or a used diskette that does not contain valuable data.

Follow this procedure for formatting a diskette in drive B.

1. Bring the system to the A> prompt. (See the previous "Loading the SLE MS-DOS System Diskette" section of this chapter for instructions.)
2. Enter the following command at the A> prompt:

   FORMAT B:

   The system will respond with the following prompt:

   Insert new diskette for Drive B:
   and strike any key when ready
3. Insert the diskette to be formatted into drive B, the bottom drive, and press any key.

The system displays the message "Formatting." When the disk is formatted, the "Format Complete" message appears. The system also displays the amount of available disk space.

After the diskette has been formatted, the following prompt appears:

Format another (Y/N)?

Enter **Y** if you want to format another diskette, or **N** to return to the A> prompt.

Copying the SLE MS-DOS System Diskette on a Dual-Drive System

Once you have formatted the diskette, you can copy the contents of the SLE MS-DOS system diskette onto it. The DISKCOPY command copies the entire contents of one diskette to another. Use this command to replicate the contents of the SLE MS-DOS system diskette, or any other data diskettes you want to backup. DISKCOPY is the fastest way to copy a diskette because it copies the entire diskette in one operation. Follow these steps.

1. Make sure that the SLE MS-DOS system diskette is inserted into drive A, and the blank, formatted diskette into drive B.
2. Enter the following command at the A> prompt:

   DISKCOPY A: B:

   The system will display the following prompt:

   Insert source diskette into Drive A:
   Insert formatted target diskette into Drive B:
   Press any key when ready
3. Make sure the SLE MS-DOS system diskette (source) and the blank, formatted diskette (target) are in the correct drives, and press any key.

The system displays the message "Copying..." Once the copy has been made, the system displays the following prompt:

Copy complete
Copy another (Y/N)?

Enter **Y** if you want to copy another diskette, or **N** to return to the A> prompt.

You now have a duplicate copy of your SLE MS-DOS system diskette in drive B and the original SLE MS-DOS system diskette in drive A. Write "SLE BACKUP" on the label of the backup diskette with a felt-tip pen.

Backing Up the SLE MS-DOS System Diskette on a Single-Drive System

Although a single-drive APC III has only one *physical* diskette drive, the system operates under the assumption that two *logical* drives are attached to the computer. All system programs and applications operate the same way on a single-drive system as on a dual-drive system. The only difference is that, when two drives are required, the system will prompt you to insert the diskette for drive B into the diskette drive even though there is only one physical drive on the system.

Formatting and Copying Diskettes on a Single-Drive System

Enter the same commands as you would on a dual-drive system. The system will prompt you to change the diskette in the drive as necessary. Be careful not to get the two diskettes mixed up. The original diskette (source) is in logical drive A, and the backup copy diskette (target) is in logical drive B.

BOOTING AND LOADING

1. A program called a "Bootstrap Loader" must be on either the diskette or hard disk to be used for starting up SLE mode. Formatting and Diskcopying from the SLE MS-DOS system diskette automatically records the "Bootstrap Loader" onto the destination disk.
2. The "Bootstrap Loader" is not accessible by any application and may not be changed by the user.
3. The SLE MS-DOS system programs are loaded into memory by the "Bootstrap Loader" and then executed.
4. The SLE MS-DOS system will load other programs into memory and then execute them.

Making a Bootable Diskette

To make a diskette "bootable," that is, a diskette that contains the "Bootstrap Loader" which enables it to "start up" SLE MS-DOS as well as contain program and data files, you must put a copy of the SLE MS-DOS system onto the diskette. To copy the SLE MS-DOS system from the SLE MS-DOS system diskette to another diskette, specify the option "/S" in the FORMAT command.

```
FORMAT B:/S
```

CAUTION

Formatting a diskette destroys all existing data on the diskette. Make sure the diskette that you are formatting is a new, unused diskette, or a used diskette whose contents are not needed.

For more information about MS-DOS system maintenance, see the *MS-DOS User's Guide*.

Chapter 3

Using the APC III Keyboard

OVERVIEW

The APC III is equipped with a detachable keyboard. Adjustable feet at the bottom of the keyboard give you a choice of two angles. Figure 3-1 shows the APC III keyboard.

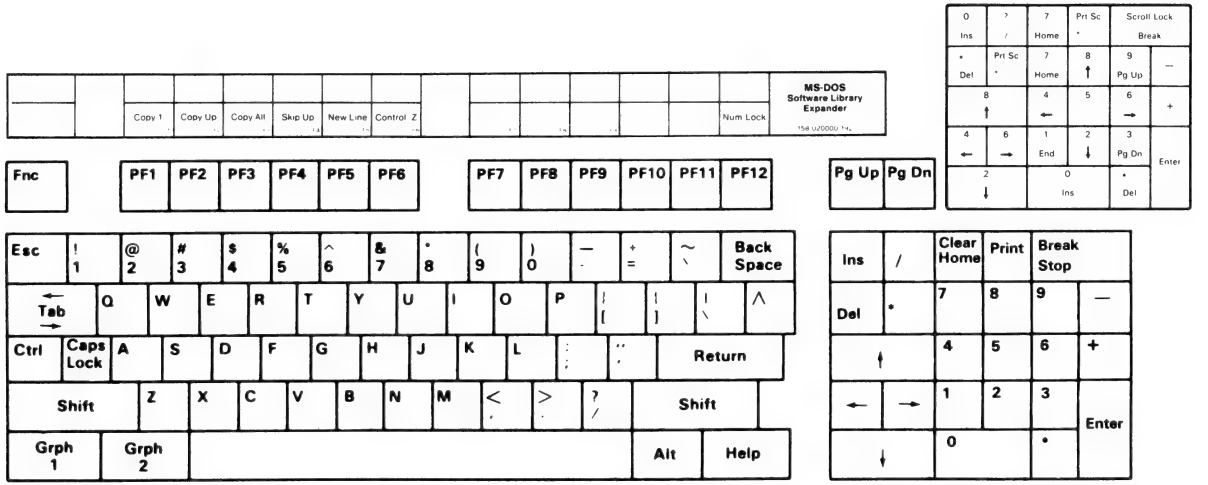


Figure 3-1 APC III Keyboard with the Keypad Template and the MS-DOS Software Library Expander Template

Two templates (the keypad template and the MS-DOS Software Library Expander template) are provided to assist you in using MS-DOS on the APC III in SLE mode. In addition, there are keypad stickers that can be used to aid you in referencing the keys used in SLE mode.

MS-DOS SOFTWARE LIBRARY EXPANDER TEMPLATE

Many of the APC III's keys perform different functions in SLE mode than they do in Specialized mode. The MS-DOS Software Library Expander template shows what functions the keys perform when using MS-DOS in SLE mode.

Insert the MS-DOS Software Library Expander template in the area above the program function keys (see Figure 3-1).

Ten programmable function keys (F1-F10) are provided, each of which can be used with one of the three shifted state keys (Shift, Ctrl, and Alt).

Table 3-1 lists the functions shown on the MS-DOS Software Library Expander template.

Table 3-1 MS-DOS Software Library Expander Template Key Functions

KEY	FUNCTION
F-1	Copy 1
F-2	Copy Up
F-3	Copy All
F-4	Skip Up
F-5	New Line
F-6	Ctrl Z

"Num Lock" also appears on this template. See page 3-6 for a description of "Num Lock."

KEYPAD TEMPLATE

The keypad template is provided to assist you in using the keyboard when running programs in SLE mode. Place the keypad template in the area above the Clear Home, Print, and Break Stop keys (see Figure 3-1).

Table 3-2 lists the functions of keys on the keypad template. Shifted states are given in parentheses.

Table 3-2 Keypad Template Key Functions

SPECIALIZED MODE KEY	SOFTWARE LIBRARY EXPANDER MODE KEY	
	NUM LOCK ON	NUM LOCK OFF
Pg Up	9	Pg Up
Pg Dn	3	Pg Dn
Pg Dn	3	Pg Dn
Ins	0	Ins
/	/ (?)	/ (?)
Clear Home	7	Home
Print	* (Prt Sc)	* (Prt Sc)
Break Stop	Scroll Lock	Scroll Lock
Del	.	Del
*	* (Prt Sc)	* (Prt Sc)
7	7	Home
8	8	Up Arrow
9	9	Pg Up
-	-	-
Up Arrow	8	Up Arrow
4	4	Left Arrow
5	5	No Action
6	6	Right Arrow
+	+	+

Table 3-2 Keypad Template Key Functions (cont'd)

SPECIALIZED MODE KEY	SOFTWARE LIBRARY EXPANDER MODE KEY	
	NUM LOCK ON	NUM LOCK OFF
Left Arrow	4	Left Arrow
Right Arrow	6	Right Arrow
1	1	End
2	2	Down Arrow
3	3	Pg Dn
Down Arrow	2	Down Arrow
0	0	Ins
.	.	Del
Enter	Enter	Enter

INACTIVE KEYS

The following keys produce no action in SLE mode.

- Grph 1
- Grph 2
- Help
- PF11
- Fnc

SPECIAL KEY FUNCTIONS

The caret (^) on the main keyboard produces the number **6** in unshifted ("base") state and the ^ in the shifted state.

Back Space moves the cursor back one character at a time and erases characters it moves over. Use **Back Space** to correct typing errors on the current line.

Return or **Enter** is used to send a command to MS-DOS. Press one of these keys after you have typed a command line.

Shift Key Priorities and Combinations

If combinations of the **Alt**, **Ctrl**, and **Shift** keys are pressed and only one is valid, the precedence is as follows: the Alt key is first, the Ctrl key is second, and the Shift key is third. The only valid combination is Alt and Ctrl, which is used in the system reset function.

Shift shifts keys to the uppercase characters. If **Caps Lock** is also pressed, pressing **Shift** invokes the unshifted state. Shift also temporarily reverses the Num Lock, or non-Num Lock state of keypad keys.

Num Lock shifts keypad keys into a "numbers only" state. In Num Lock state, the upper functions in the keypad template are active. Pressing **Num Lock** a second time releases the keyboard from the Num Lock state so that the lower functions in the keypad template are active.

Ctrl temporarily shifts many keys to the Ctrl state. (For example, **Ctrl-Z** indicates end-of-file.) Also, the **Ctrl** key is used with the **Alt** and **Del** keys to reset the system, with the **Scroll Lock** key to cause the break function, and with the **Num Lock** key to cause the pause function. The system reset, break, and pause functions are described later in this chapter.

Alt temporarily shifts many keys in the Alt state. Also, the **Alt** key is used with the **Ctrl** and **Del** keys to cause the system reset function described later in this chapter.

The **Alt** key also allows the user to enter any ASCII character code from 0 to 255 into the system from the keyboard. The user holds down the **Alt** key and types the decimal value of the characters desired, using the numeric keypad, and then releases the Alt key.

If more than three digits are typed, a modulo-256 result is created. These three digits are interpreted as a character code and are transmitted through the keyboard routine to the system or application program.

Caps Lock shifts many keys to uppercase. Pressing the **Caps Lock** key a second time reverses the action.

Scroll Lock is interpreted by appropriate application programs as indicating that the use of the cursor-control keys should cause windowing over the text rather than cursor movement. Pressing the **Scroll Lock** key a second time reverses the action. The keyboard routine simply records the current shift state of the Scroll Lock key. It is the responsibility of the system or application program to perform the function.

Special Key Combinations

At times, the keys on the keyboard and keypad can be used in combinations to perform special functions. Press the keys simultaneously to perform these functions.

LINE FEED

Ctrl-Return or **Ctrl-Enter** produces a line feed.

SYSTEM RESET

Ctrl-Alt-Del pressed in the order indicated reloads the MS-DOS system. Use this to exit from infinite loops encountered during program execution, or from situations where the system has been corrupted. This function is also referred to as a "warm boot."

PRINT SCREEN

Shift-Print or **Shift-Prt Sc** causes the system to print out everything displayed on the screen (text data or graphics). Note: GRAPHICS.COM must have been run previously to print out a graphics screen.

BREAK

Ctrl-Break invokes the keyboard routine signaling interrupt hex 1B. Also the extended characters (A = hex 00, AH = hex 00) will be returned.

PAUSE

Ctrl-Num Lock causes the system to pause and wait for any key (except the Num Lock key) to be pressed to resume operation. This provides a system or application-transparent method of temporarily suspending list, print, and other output functions.

ECHO TO PRINTER

Ctrl-Prt Sc (or **Print** or **P**) causes the system printer to print (echo) all characters output to the display.

Command Line Template Editing Keys

The APC III uses the unshifted function keys 1 through 6, with several special keys (Del, Esc, Ins), as MS-DOS command line template editing keys. (See the *MS-DOS User's Guide* for command line editing directions.) Table 3-3 defines the functions of these keys.

Table 3-3 Command Line Template Editing Key Functions

KEY	FUNCTION
F-1 <Copy 1>	Copies one character from the template to the command line.
F-2 <Copy Up>	Copies characters up to the character specified in the template and puts these characters on the command line.
F-3 <Copy All>	Copies all remaining characters in the template to the command line.
F-4 <Skip Up>	Skips over (does not copy) the characters in the template up to the character specified.
F-5 <Newline>	Makes the newline the new template.

Table 3-3 Command Line Template Editing Key Functions (cont'd)

KEY	FUNCTION
F-6 <Ctrl Z>	Puts a Control-Z (1AH) end-of-file character in the new template.
Del <Skip 1>	Skips over (does not copy) a character in the template.
Esc <Void>	Voids the current input; leaves the template unchanged.
Ins <Insert>	Enters/exits insert mode.

Refer to the *MS-DOS Programmer's Reference Guide* (and its supplement), the *MS-DOS User's Guide* and the *APC III System Reference Guide* for further information on the APC III keyboard.

Chapter 4

Hard Disk Setup

USING THE HARD DISK IN SLE MODE

The APC III offers several hard disk options, including both internal and external hard disk drives. The following APC III Software Library Expander custom utilities have been provided for hard disk users on the SLE MS-DOS system diskette.

HDSETUP:	Initializes the hard disk and partitions it.
FORMAT:	Formats a hard disk partition.
BOOT:	Allows the user to specify which drive the system is to boot from.
RETRACT:	Retracts the hard disk read/write heads to a safe position for power-off.

CAUTION

DO NOT use any utilities, commands, or programs for SLE mode in Specialized mode.

DO NOT use any utilities, commands, or programs for Specialized mode in SLE mode.

SETTING UP THE HARD DISK

The APC III custom utility, HDSETUP, is a menu-driven utility that provides the functions needed to prepare and maintain hard disk storage space for partial or full availability under MS-DOS.

The following sections explain how to initialize and maintain disk storage space. They include examples of the use of HDSETUP options.

Disk Drive Designators

MS-DOS refers to the diskette and hard disk drives with alphabetic characters called drive designators. For a dual-drive APC III, the first diskette drive is referred to as drive A: and the second as drive B:. For a single-drive APC III, MS-DOS still recognizes two diskette drives even though there is only one physical diskette drive in the base unit. (See "Appendix A" of the *MS-DOS User's Guide* for more information.)

Because it is possible to have two hard disk units attached to the APC III, MS-DOS reserves the drive designations C: and D: for these disks. C: refers to the first (master) hard disk unit (unit #0), and D: refers to the second (slave) hard disk unit (unit #1).

Just as a diskette must be formatted before it can be used to store information, a hard disk must also be prepared. If a user attempts to use a hard disk before it has been prepared, the following error message will be displayed.

Bad unit error reading drive C (or D)

Partition Summary

Hard disks are divided into storage areas called partitions. The maximum number of partitions is 12. These partitions, which can belong to different operating systems, may vary in size and format. Some restrictions will apply, such as minimum partition size, but they are operating-system dependent. HDSETUP operates on MS-DOS partitions only. Partitions for other operating systems, such as PC-UX, must be allocated using setup utilities written for that operating system. Such partitions are referred to as *other* partitions.

CAUTION

Although the hard disk may contain both MS-DOS and PC-UX partitions, the PC-UX Memory Management board and SLE board must not be installed at the same time. To use the Software Library Expander, the PC-UX Memory Management board must be removed, and vice versa.

Before creating any partitions on the hard disk, evaluate how the disk will be used. For example, if the disk will be shared by two or more operating systems, enough space must be left available for any non-MS-DOS partitions to be created. If more than one user will be storing data on the hard disk, it may be desirable to create an MS-DOS partition for each user. Because MS-DOS allows only one partition to be active at a time, a single MS-DOS user may want to allocate the entire disk as one large MS-DOS partition.

Each 10-MB hard disk available for use with the APC III has 1240 tracks. (A track is a physical area of the disk.) The user defines the size of a partition by specifying the number of tracks that will be used for a particular partition. The first two tracks of the hard disk, tracks 0 and 1, are reserved for special information, including the Hard Disk Partition Table. This table contains information describing disk use, such as partition names, sizes, and starting track numbers. (Refer to the *APC III Supplement to the MS-DOS Programmer's Reference Guide* for additional information.) The remaining 1238 tracks may be assigned to MS-DOS partitions or left for other operating systems.

Note that the tracks are numbered starting with 0. Therefore, the disk has 1240 tracks which are numbered 0 through 1239.

Tables 4-1 and 4-2 summarize what you need to know to define partitions that will be used under MS-DOS.

Table 4-1 Partition Summary

PARTITION DESCRIPTION	TRACKS
Minimum Number of Partitions per Disk	1
Maximum Number of Partitions per Disk	12
Minimum Partition Size for MS-DOS	9 tracks
Maximum Partition Size for MS-DOS	1238 tracks

If desired, PC-UX can be installed on a hard disk with MS-DOS. PC-UX requires at least 2 of the available 12 partitions with the following approximate minimum size requirements.

Partition RHD00: 4800 tracks
Partition RHD01: 120 tracks

Table 4-2 Hard Disk Track Summary

LOGICAL TRACK NUMBER	PHYSICAL TRACK NUMBER	COMMENTS
0	1	Reserved
1	2	Reserved
2 3 • • • 1239	3 4 • • • 1240	Available for use

Disk Preparation Summary

Hard disks, like diskettes must be formatted before they can be used to store information. The following list summarizes the procedures for preparing a hard disk for use, creating a partition, and making the partition available to MS-DOS.

1. The HDSETUP option Format must be used once to initialize the entire disk (tracks 0 through 1239).
2. The HDSETUP option Create must be used to specify the name, starting track, and number of tracks to be used for a partition. (All partitions defined with the Create option are MS-DOS partitions.) Create can be used as many times as desired to define partitions.
3. The HDSETUP option Activate must be used to give a partition "active" status, that is, to make it accessible to MS-DOS.
4. While a partition is active, the MS-DOS utility FORMAT must be used to format the partition.

The following sections provide detailed examples of the use of the HDSETUP options.

INITIALIZING THE HARD DISK (HDSETUP FORMAT OPTION)

The first step in preparing the hard disk is to initialize it. Enter the following command at the A> prompt to start HDSETUP, the hard disk setup utility:

```
HDSETUP
```

Before the hard disk has been initialized, the following message appears.

```
Current Hard Disk Unit #0 (1240 tracks)

The drive configuration cannot be read
A new configuration will be created

Type <space> to continue, <esc> to exit
```

HDSETUP always examines unit #0 first. Unit #0 is a 10-MB hard disk, so HDSETUP indicates that there are 1240 tracks on the disk. Since this is an uninitialized disk, there is no drive configuration. Press the **space bar** to continue. The following screen will be displayed.

```
Current Hard Disk Unit #0 (1240 tracks)

Part   Name   Status   System   Start   End   Size
 1
 2
 3
 4
 5
 6
 7
 8
 9
10
11
12
Options:  Activate, Create, Delete, Format,
          Select, Exit:
```

Screen 4-1 Partition Table

The screen displays the partition information for the hard disk. No partition information is displayed because no partitions are yet defined.

When using HDSETUP, only the first letter of the operation must be entered to select an operation. HDSETUP will prompt you for any additional information that is needed. If you make a mistake at any point in an operation, press the **Esc** key to terminate the operation.

The Format operation must be performed first. Enter **F**. The following message will be displayed at the bottom of the partition table.

```
FORMAT ENTIRE DISK (Y/N)?
```

The Format option of HDSETUP operates in two modes. It is possible to initialize the entire disk, including the partition configuration, or to format on a track-by-track basis. The first time that a hard disk unit is connected, the entire disk must be initialized, so enter **Y**. HDSETUP displays the following prompt.

```
ALL DATA AND CONFIGURATION
WILL BE DESTROYED.
ARE YOU SURE (Y/N)?
```

This warning informs the user that all tracks, including those allocated to *other* operating system partitions, will be formatted and that all data, including the hard disk partition table, will be destroyed. If this is not desirable, enter **N** to return to the options menu.

Aside from the first initialization of the hard disk unit, formatting the entire disk may be desirable if the partition configuration has been destroyed or if you want to reallocate all the partitions. Before doing so, be sure to back up all important files.

To continue the example, enter **Y**. The entire disk will now be formatted and a new configuration will be created.

Formatting a Section of a Hard Disk

Sometimes it is desirable to format only selected sections of a disk. HDSETUP permits formatting track-by-track so that a section of the hard disk may be formatted. Note that this mode of formatting initializes only tracks that are unallocated or allocated to MS-DOS partitions. It will not initialize tracks allocated to *other* operating systems.

Enter **HDSETUP** at the A> prompt. The following prompt appears.

FORMAT ENTIRE DISK (Y/N)?

Enter **N** to format on a track-by-track basis.

HDSETUP then displays this message:

Enter starting track number:

Enter the starting and ending track numbers with extreme caution to be sure you don't format tracks you want to preserve.

Enter the number for the first track to be initialized, for example, **200**. HDSETUP displays the following prompt.

Enter ending track number:

Enter the number of the last track to be initialized. For this example, enter **1239** (the last track on the disk). This is the total number of tracks displayed at the top of the screen, minus 1, since the tracks are numbered relative to 0.

HDSETUP checks the configuration to see if these tracks are available and displays the following message.

Formatting may DESTROY data.
Are you sure (Y/N)?

This is a safety feature to prevent the accidental overwrite of information that is stored on the disk. Enter **Y** to continue. Enter **N** if you made a mistake.

Formatting begins, and as each track is formatted, HDSETUP updates the number of remaining tracks on the screen until the operation is complete. Tracks 200 through 1239 are now initialized.

PARTITIONING THE HARD DISK (HDSETUP CREATE OPTION)

After the hard disk has been initialized by the Format option of HDSETUP, it can be partitioned. The next few sections show several examples of using the HDSETUP option Create to define partitions.

Note that partition names, although optional, may consist of the same set of characters as MS-DOS file names.

Using Create to Define a Single MS-DOS Partition

In this example, the entire disk will be allocated as a single MS-DOS partition. Enter **C** to select the Create option of HDSETUP. The following prompt will be displayed.

```
Enter starting track number:
```

For all partitioning schemes, the first available track is track 2. The first two tracks (0 and 1) are reserved. Enter **2**. HDSETUP will display the following prompt.

```
Enter partition size:
```

In this example the maximum size for the partition is 1238 tracks (1240 minus 2). Enter **1238**; HDSETUP now prompts:

```
Enter partition name (8 char.):
```

Give the partition a name having up to eight characters. The name will be recorded in the partition table and can be useful in keeping track of what is stored in a partition. For this example, the partition will be called MSDOSPAR to indicate that it is a general-purpose MS-DOS partition. Enter **MSDOSPAR**. The partition table on the screen will be updated as shown in the following screen.

```
Current Hard Disk Unit #0 (1240 tracks)

Part    Name    Status    System    Start    End    Size
 1    MSDOSPAR    N       MS-DOS     0002   1239    1238
 2
 3
 4
 5
 6
 7
 8
 9
10
11
12
Options:  Activate, Create, Delete, Format,
          Select, Exit:
```

Screen 4-2 Partition Table with a 1238-Track Partition

The MS-DOS partition has been created and may be activated. See the section on activating the MS-DOS partition.

Using Create to Define Several MS-DOS Partitions

In this example, the disk will be allocated into three MS-DOS partitions. One will be a general-purpose MS-DOS partition belonging to a user of the system. The second and third partitions will both belong to another user who wants to keep two projects separate from each other.

To begin, enter **C** to select the Create option of HDSETUP, which displays the following prompt.

Enter starting track number:

As in the previous example, the first available track is track 2. The first two tracks (0 and 1) are reserved. Enter **2**. HDSETUP will display the following prompt.

Enter partition size:

In this example, the first partition will be for the user who needs 600 tracks. Enter **600**; HDSETUP will display the following prompt.

Enter partition name (8 char.):

Give the partition a name up to eight characters in length. In this case, the names are important since the partitions belong to different users. This partition will be called BOBSDOS to indicate that it is Bob's general purpose MS-DOS partition.

Enter **BOBSDOS**. The partition table on the screen is updated as shown in the next screen.

```
Current Hard Disk Unit #0 (1240 tracks)

Part    Name    Status    System    Start    End    Size
 1     BOBSDOS    N       MS-DOS     0002   0601     600
 2
 3
 4
 5
 6
 7
 8
 9
10
11
12
Options:  Activate, Create, Delete, Format,
          Select, Exit:
```

Screen 4-3 Partition Table with a 600-Track Partition

The following operations will create the second and third partitions. After performing these operations, the partition table will appear as shown in Screen 4-4.

Enter **C**. Then enter items listed in bold:
Enter starting track number: **602**
Enter partition size: **300**
Enter partition name (8 char.): **JIMSGAME**

Enter **C**. Then enter items listed in bold:
Enter starting track number: **902**
Enter partition size: **338**
Enter partition name (8 char.): **JIMSACCT**

```
Current Hard Disk Unit #0 (1240 tracks)

Part   Name    Status   System   Start   End   Size
 1    BOBSDOS    N      MS-DOS    0002  0601   600
 2    JIMSGAME   N      MS-DOS    0602  0901   300
 3    JIMSACCT   N      MS-DOS    0902  1238   338
 4
 5
 6
 7
 8
 9
10
11
12
Options:  Activate, Create, Delete, Format,
          Select, Exit:
```

Screen 4-4 Partition Table Listing Three Partitions

These partitions were created in sequential order, but JIMSACCT could have been created before BOBSDOS. Tracks may be allocated in any order; however, they appear in track-number order in the partition table, regardless of when they were created. This also applies to *other* operating system partitions.

Partitioning the Hard Disk for More Than One Operating System

In this example, one MS-DOS partition will be allocated. Because this user intends to share the hard disk with another operating system (PC-UX for this example), some tracks will be left available. Enter **C** to select the Create option of HDSETUP. The following prompt will appear.

```
Enter starting track number:
```

As in the first two examples, the first available track is track 2. The first two tracks (0 and 1) are reserved. In this case, enter **2**. HDSETUP will display the following prompt.

Enter partition size:

In this example the user has decided to allocate 500 tracks to an MS-DOS partition and leave the rest of the disk available. Enter **500**. HDSETUP will display the following prompt.

Enter partition name (8 char.):

This partition will be labeled DOSPART to indicate that it is a general-purpose MS-DOS partition. Enter **DOSPART**. The partition table on the screen will be updated as shown in Screen 4-5.

```
Current Hard Disk Unit #0 (1240 tracks)

Part   Name    Status   System   Start   End   Size
 1    DOSPART    N      MS-DOS    0002  0501    500
 2
 3
 4
 5
 6
 7
 8
 9
10
11
12
Options:  Activate, Create, Delete, Format,
          Select, Exit:
```

Screen 4-5 Partition Table Listing a 500-Track Partition

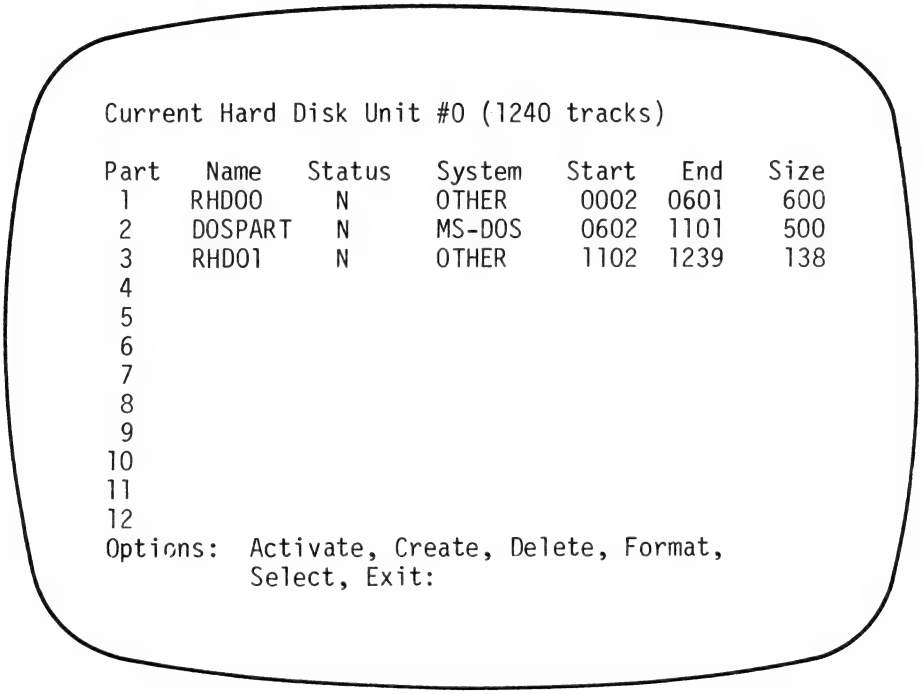
The remaining tracks on the disk can then be allocated using another operating system's partition utility. The partitions created with another operating system also appear in the partition table. For example, if two partitions were created for PC-UX (call them RHD00 and RHD01), the partition table would appear as shown in Screen 4-6.

```
Current Hard Disk Unit #0 (1240 tracks)

Part    Name    Status    System    Start    End    Size
 1     DOSPART     N       MS-DOS     0002   0501     500
 2     RHD00       N       OTHER      0502   1101     600
 3     RHD01       N       OTHER      1102   1239     138
 4
 5
 6
 7
 8
 9
10
11
12
Options:  Activate, Create, Delete, Format,
          Select, Exit:
```

Screen 4-6 Partition Table Listing MS-DOS and OTHER Partitions

Notice that HDSETUP does not indicate what operating system the other partitions belong to. It only designates partitions as MS-DOS or *other*. *Other* partitions may reside anywhere (any starting and ending tracks) on the disk; they do not have to be contiguous. For example, Screen 4-7 shows an alternate partitioning scheme that provides the same amount of disk space and the same end results as those shown in Screen 4-6.



```
Current Hard Disk Unit #0 (1240 tracks)

Part    Name    Status    System    Start    End    Size
 1     RHD00      N       OTHER      0002   0601     600
 2     DOSPART    N       MS-DOS     0602   1101     500
 3     RHD01      N       OTHER      1102   1239     138
 4
 5
 6
 7
 8
 9
10
11
12
Options:  Activate, Create, Delete, Format,
          Select, Exit:
```

Screen 4-7 Partition Table Listing Non-Contiguous PC-UX Partitions

PC-UX NOTE

PC-UX can reside on a hard disk along with MS-DOS. The two PC-UX partitions required in the installation of PC-UX have the following approximate minimum size requirements:

RHD00: 480 tracks (4-MB)
RHD01: 120 tracks (1-MB)

These tracks may be left available in any position on the hard disk. Leaving a sufficient number of tracks unallocated avoids having to back up all files and repartition the hard disk.

CAUTION

Although the hard disk may contain both MS-DOS and PC-UX partitions, the PC-UX Memory Management board and SLE board must not be installed at the same time. To use the Software Library Expander, the PC-UX Memory Management board must be removed, and vice versa.

ACTIVATING THE MS-DOS PARTITION (HDSETUP ACTIVE OPTION)

Although several MS-DOS partitions may be created on a single hard disk, only one may be active at any time. This implies that if partition 1 is the active MS-DOS partition, then only the files in partition 1 are available for access. In order to gain access to files in another MS-DOS partition, HDSETUP must be used to change the active partition.

Making a partition the active MS-DOS partition is accomplished by using the Active option. In Screen 4-3, there is only one partition that can be activated. In Screen 4-4, the two users would have to switch between partitions. Using the partitions set up in Screen 4-4, enter **A**. HDSETUP displays the following prompt.

Enter the number of the MS-DOS partition.

To activate the BOBSDOS partition, enter **1**. The partition table is displayed as shown in Screen 4-8.

```
Current Hard Disk Unit #0 (1240 tracks)

Part   Name    Status   System   Start   End   Size
 1     BOBSDOS   A      MS-DOS    0002  0601   600
 2     JIMSGAME  N      MS-DOS    0602  0901   300
 3     JIMSACCT  N      MS-DOS    0902  1238   338
 4
 5
 6
 7
 8
 9
10
11
12
Options:  Activate, Create, Delete, Format,
          Select, Exit:
```

Screen 4-8 Partition Table Listing BOBSDOS as Active

The "A" under "Status" indicates that partition 1 is the active MS-DOS partition. You can now exit HDSETUP by selecting the Exit option, and then use the MS-DOS FORMAT utility, which is described in the next section. The Active option of HDSETUP, like Create and Delete, applies only to MS-DOS partitions. *Other* operating systems will provide utilities specific to their needs.

Note that the Exit option always returns the user to the root directory of the default drive.

FORMATTING THE PARTITION FOR MS-DOS (MS-DOS FORMAT COMMAND)

After the hard disk has been initialized and an MS-DOS partition has been created and activated, run the MS-DOS utility, FORMAT. You must do this in order to write information that MS-DOS expects onto a partition of the hard disk. (This operation is different from the Format option of HDSETUP, which initializes the hard disk.)

FORMAT operates the same way as it does for a diskette (see the *MS-DOS User's Guide*), except that it formats only the active partition, not the entire disk. The /S and /V options work the same way. It is especially important to use the /S option if you wish to be able to boot from the hard disk because it brings over the necessary system files.

In this example, the partition BOBSDOS (the activated partition in Screen 4-8) will be formatted. Because the partition resides on hard disk unit #0, MS-DOS will refer to it as drive C:. Enter the following command:

```
FORMAT C: /S
```

This formats the partition BOBSDOS and allows it to be accessed by MS-DOS. It is important to realize that only one partition has been formatted for MS-DOS. If other partitions are created and subsequently activated, they must also be formatted once before MS-DOS can access the disk. Once a partition has been formatted, it does not have to be reformatted.

DELETING AN MS-DOS PARTITION (HDSETUP DELETE OPTION)

The Delete option of HDSETUP removes only MS-DOS partitions. If you attempt to delete a partition belonging to any *other* operating system, an error message will appear. To delete a partition, run HDSETUP and enter **D** to request the delete operation. HDSETUP displays the following prompt.

```
Enter the number of the MS-DOS partition
you want to delete:
```

Enter the partition number as shown in the table. HDSETUP dislays the following warning prompt.

> All data in the MS-DOS partition will be
> DESTROYED. Are you sure (Y/N)?

Enter **Y** to continue the delete process. The deleted partition is removed from the partition table and the tracks it occupied become available.

Note that partitions are listed in sequential track order, and partition numbers change as partitions are created and deleted.

SELECTING THE HARD DISK UNIT (HDSETUP SELECT OPTION)

The Select option of HDSETUP provides a way to choose between hard disk units #0 and #1. HDSETUP always defaults to unit #0, and unit #1 must be selected in order to access it. Enter **S** to start the Select operation. HDSETUP displays the following prompt.

> Enter the unit number (0/1):

Enter the unit number desired. The partition table for the selected unit is displayed.

All previous operations and examples apply to hard disk unit #1 exactly as described for unit #0. Once unit #1 has been selected, proceed as described in the previous sections. When running the MS-DOS FORMAT or other commands, use drive designator D: for hard disk unit #1.

BOOTING FROM THE HARD DISK

One of the APC III's features is its ability to boot MS-DOS from hard disk. The first requirement is that an active MS-DOS partition be formatted with the /S option of the MS-DOS FORMAT command. Note that the /S option copies IO.SYS, MSDOS.SYS and COMMAND.COM to the destination volume. APC III users must also copy ANSI.SYS, CONFIG.SYS, and any other installable drivers or utilities to the hard

disk volume. The next step is to designate the volume as the boot volume. This is accomplished in two ways.

The first method is to select the boot drive with the BOOT utility described in Chapter 5, "SLE MS-DOS Utilities." The second method, which applies only to hard disk unit #0, is to use a function key as described in the following paragraph.

At power-on or reset, press the function key corresponding to the number of the active bootable partition in the HDSETUP partition table. For example, if the third partition of unit #0 (drive C) is the active MS-DOS bootable partition, press **PF3** and **Reset** (or POWER). Continue to press **PF3** until the disk access lights indicate that the system is booting.

BOOTING FROM DISKETTE

Should you decide to boot from diskette drive A, power-on or reset while holding down **Fnc**. If the BOOT utility was used to select drive D, then it must be used again to redefine the system boot drive.

Additional technical information regarding the partitioning and operation of the APC III hard disks can be found in the *APC III Supplement to the MS-DOS Programmer's Reference Guide.*

Chapter 5

SLE MS-DOS Utilities

OVERVIEW

The SLE MS-DOS utilities can be used on the APC III in SLE mode. These utilities are supported in addition to the standard MS-DOS commands. See the *MS-DOS User's Guide* for the standard MS-DOS commands.

This chapter describes the SLE MS-DOS utilities that are not specifically dedicated to batch processing files. Summaries of these utilities appear in alphabetical order in Table 5-1.

Table 5-1 SLE MS-DOS Utility Summaries

UTILITY	SUMMARY
ASSIGN	Routes requests for one drive to another.
xASSIGN	Permits use of a different drive and allows file access from a new path.
BACKUP	Backs up files from a hard disk.
BOOT	Designates the MS-DOS system boot drive or volume (partition).
CHMOD	Changes and displays file and/or directory attributes.
COMP	Compares the contents of a file or group of files with others to verify that they are identical.
DISKCOMP	Compares the contents of two diskettes.
DISKCOPY	Copies disks.
FORMAT	Formats a disk to accept data.
GRAPHICS	Prints graphics from the screen onto a graphics printer.
HDSETUP	Displays the current hard disk partition table.
MODE	Sets display, communications, serial port environments, and list device parameters.
RESTORE	Restores files, created using the backup utility, to the hard disk.
RETRACT	Retracts the access arm of the hard disk to its safe landing area.
SIZE	Displays file sizes and diskette space required to contain specified files.
TREE	Displays directories and their contents.
xTREE	Displays all of the subdirectories, and optionally files, within the directory found on the specified drive.

CAUTION

DO NOT use any utilities, commands, or programs for SLE mode in Specialized mode.

DO NOT use any utilities, commands, or programs for Specialized mode in SLE mode.

DEVICE NAME DIFFERENCES IN SLE MODE

In SLE mode, another set of reserved file names for the serial and parallel port devices is available. These device names are provided in addition to the Specialized mode device names so that either name may be used in SLE mode.

Device name correspondence:

Specialized Mode	*SLE Mode*
AUX	COM1
AUX2	COM2
AUX3	COM3
PRN	LPT1

INFORMATION COMMON TO ALL MS-DOS COMMANDS

1. Commands are usually followed by one or more options.
2. Commands and options may be entered in uppercase or lowercase, or a combination of the two.
3. Commands and options must be separated by delimiters. Because they are easiest to type, you will usually use the space and comma as delimiters. For example:

   DEL MYFILE.OLD NEWFILE.TXT
   RENAME, THISFILE THATFILE

   You can also use the semicolon (;), the equal sign (=), the slash (/), or the **Tab** key as delimiters.
4. Do not separate the parts of a file specification (d:filename.ext) with delimiters; the colon and the period already serve as delimiters.
5. When instructions say "Press *any* key," you can press an alpha (**A-Z**) key, numeric (**0-9**) key, the **space bar**, or the **Return** key.
6. Files are not required to have filename extensions. However, you must include the filename extension when referring to a file that has such an extension.
7. You can abort *some* commands when they are running by pressing **Ctrl-C**.
8. Commands take effect only after you have pressed **Return**.

9. Wild cards (global filename characters) and device names (for example, COM1 or LPT1) are not allowed in the names of any commands.
10. When commands produce a large amount of output on the screen, the display will automatically scroll to the next screen. Press **Ctrl-S** to suspend the display. Press any key to resume the display.
11. MS-DOS editing and function keys can be used when entering commands. Refer to Chapter 3 of this document and to Chapter 6 of the *MS-DOS User's Guide* for a complete description of these keys.
12. The prompt from the command processor is the default drive designation plus a greater-than sign; for example, A>.
13. Disk drives are referred to as *source* drives and *target* (or destination) drives. A source drive contains the data you want to transfer. A target drive is the drive you are transferring the data to.

UTILITY FORMATS

Each utility is presented with the following format:

The utility name appears first. The purpose of the utility is discussed, followed by the syntax required to invoke the utility.

Comments governing the use of the utility are then presented, followed by examples that demonstrate the utility's uses and show the dialogue between the user and the computer.

A "Notes" section gives additional information, or suggestions for the use of the utility.

Exit codes, if any, are listed for each utility.

The common notation used to represent file specifications is

[d:][path][filename.ext]

where

d: is the name of the disk drive holding the file.
path is the directory path to the file.
filename is the root name of the file.
.ext is the filename extension.

Items in square brackets ([ ]) are optional. If any part of the notation does not appear in the file specification, the omitted part is not allowed with this command. For example, the notation d:filename.ext (missing path) indicates that path names are not allowed in the command.

HOW TO ENTER MS-DOS COMMANDS

MS-DOS commands must be entered in an exact form — called command syntax — in order to have the correct results. The following notation is used throughout this book to express MS-DOS commands and all of their optional modifiers.

- Enter any words that are shown in uppercase (CAPITAL) letters. Words must be entered exactly as shown, although you can enter them in either uppercase or lowercase characters.

- Anything enclosed in angle brackets (<>) must be entered. For example, you must enter the name of your file when <filename> is asked for in a command. Do not enter the angle brackets.

- Items in square brackets ([ ]) are optional. Enter only the information asked for within the brackets. Do not enter the square brackets.

- Items in braces ({ }) indicate alternatives, one of which you must choose, unless they are optional, that is, enclosed in square brackets ([ ]).

- An ellipsis (...) indicates that the entry may be repeated as many times as needed.

- Enter all punctuation shown (with the exception of angle and square brackets, ellipses, braces, or in special cases, vertical bars), such as commas, equal signs, question marks, colons, or slashes. These punctuation marks are essential and must be entered exactly as shown.

- A vertical bar (|) appearing in a command entry indicates a toggle switch, or a list of choices, only one of which can be chosen. Do not enter the vertical bars.

- MS-DOS always assumes that input comes from the keyboard and output goes to the terminal screen. However, the flow of command input and output can be redirected. Input can come from a file rather than a terminal keyboard, and output can go to a file or to a line printer instead of to the terminal screen. In addition, "pipes" can be created that allow output from one command to become the input to another. Redirection and pipes are discussed in the next sections.

- Most commands produce output that is sent to your terminal screen. You can send this information to a file by using a greater-than sign (>) in your command. For example, the command,

  DIR

  displays a directory listing of the disk in the default drive *on the terminal screen*. The same command can send this output to a file named MYFILES by designating the output file on the command line:

  DIR >MYFILES

  If the file MYFILES does not already exist, MS-DOS creates it and stores your directory listing in it. If MYFILES already exists, MS-DOS overwrites what is in the file with the new data.

- If you want to append your directory or a file to another file (instead of replacing the entire file), two greater-than signs (>>) can be used to tell MS-DOS to append the output of the command (such as a directory listing) to the end of a specified file. The command,

  DIR >>MYFILES

  appends your directory listing to a currently existing file named MYFILES. If MYFILES does not exist, it is created.

- It is often useful to have input for a command come from a file rather than from a terminal. This is possible in MS-DOS by using a less-than sign (<) in your command. For example, the command,

  SORT <NAMES >LIST1

  sorts the file NAMES and sends the sorted output to a file named LIST1.

- A filter is a command that reads your input, transforms it in some way, and then outputs it, usually to your terminal or to a file. In this way, the data is said to have been "filtered" by the program. Since filters can be put together in many different ways, a few filters can take the place of a large number of specific commands.

  MS-DOS filters include FIND, MORE, and SORT. Their functions are described below:

FIND	Searches for a constant string of text in a file.
MORE	Takes standard terminal output and displays it, one screen at a time.
SORT	Sorts text.

  You can see how these filters are used in the next section.

- If you want to give more than one command to the system at a time, you can "pipe" commands to MS-DOS. For example, you may occasionally need to have the output of one program sent as the input to another program. A typical case would be a program that produces output in columns. It could be desirable to have this columnar output sorted.

  Piping is done by separating commands with the pipe separator, which is the vertical bar symbol (|). For example, the command,

  DIR | SORT

  will give you an alphabetically sorted listing of your directory. The vertical bar causes all output generated by the left side of the bar to be sent to the right side of the bar for processing.

  Piping can also be used when you want to output to a file. If you want your directory sorted and sent to a new file (for example, DIREC.FIL), you could enter

  DIR | SORT >DIREC.FIL

  MS-DOS will create a file named DIREC.FIL on your default drive. DIREC.FIL contains a sorted listing of the directory on the default drive, since no other drive was specified in the command. To specify a drive other than the default drive, enter

  DIR | SORT >B:DIREC.FIL

  This sends the sorted data to a file named DIREC.FIL on drive B.

A pipeline may consist of more than two commands. For example,

DIR | SORT | MORE

will sort your directory, show it to you one screen at a time, and put --MORE-- at the bottom of your screen when there is more output to be seen.

You will find many uses for piping commands and filters.

SLE MS-DOS UTILITIES DESCRIPTIONS

ASSIGN

Purpose:

The ASSIGN command tells MS-DOS to direct all requests from one drive to another.

Syntax:

ASSIGN [drivespec1=drivespec2]

Comments:

Enter only the drive letters. Do not enter the colons on the command line.

Drivespec1 is source drive, drivespec2 is the new destination drive.

Entering the **ASSIGN** command without any original or destination parameters resets the current assignments to the default values.

ASSIGN could be useful in an AUTOEXEC.BAT file.

ASSIGN works unpredictably when used with the PRINT command. Do not use ASSIGN with the PRINT command.

DISKCOPY and DISKCOMP commands ignore drive assignments.

xASSIGN

Purpose:

The xASSIGN command tells MS-DOS to use a specified diskette or hard disk drive for disk operations. It also lets you specify a new path for file access.

Syntax:

xASSIGN [X=Y][/D][/L]

or

xASSIGN [filename=[d:]\path\filename][/D][/L]

Comments:

The first form of xASSIGN tells MS-DOS to direct all requests for a diskette drive to a specified drive. The first drive specifier (X) is understood by MS-DOS to mean the second drive (Y). A colon is not required in the drive specified by xASSIGN.

The second form of xASSIGN routes all filename requests to a path. The new pathname <[d:]\path\filename> is substituted for <filename>.

Entering **xASSIGN** with no parameters clears all previous assignments.

Use xASSIGN to specify the drive(s) you want to use with applications that do not otherwise let you select the diskette or hard disk drive used by the program. By using a command such as

xASSIGN A=C B=C

those applications can be made to use drives other than A and B, such as hard disk.

xASSIGN can also be used for all applications that have overlay files. For example, if you want the program Wordstar to look for its overlay files in the subdirectory OVERLAY, enter

xASSIGN wsovly1.ovr=[d:]\overlay\wsovly1.ovr
xASSIGN wsmsgs.ovr=[d:]\overlay\wsmsgs.ovr

Examples:

xASSIGN A=C

routes all requests for drive A to drive C. Thus, the command **DIR A:** displays the directory of the diskette in drive C.

xASSIGN A=C B=C

routes any requests for drive A or drive B to drive C.

xASSIGN wsovly1.ovr=c:\overlay\wsovly1.ovr

redirects references to WSOVLY1.OVR to the file by that name in the directory C:OVERLAY. When a request for the file WSOVLY1.OVR is received, MS-DOS changes it to C:\OVERLAY\WSOVLY1.OVR. This allows all requests for the overlay file to be handled, regardless of the current directory.

xASSIGN

clears all assignments. Requests for drive A are sent to physical drive A, etc., and requests for filename go to the current directory.

Before the assignments are cleared, this warning is displayed:

Are you sure (Y/N)?

Options:

xASSIGN has two option switches, /D (delete), and /L (list assignments).

The command

xASSIGN A=C /D

deletes the A=C assignment. All other assignments remain as previously set.

The command

xASSIGN wsovly1.ovr=c:\o

deletes the WSOVLY1.OVR file red

The command

xASSIGN /L

displays the current assignment settir

```
***** Current Assignmer

Requests for Path(s)        Will be Routed to Path(s)

    wsovly1.ovr  ............  c:\overlay\wsovly1.ovr
    wsmsgs.ovr  ............  c:\overlay\wsmsgs.ovr
    a:  ....................  c:
```

Screen 5-1 xASSIGN Display

NOTE

Reassign your drives only when necessary. xASSIGN should never be used with the PRINT command or when running MS-DOS in normal operations, because it hides the true device type from commands and programs that require actual drive information.

The MS-DOS utility commands DISKCOPY and DISKCOMP ignore drive reassignments.

If you are developing an application program, you should avoid using specific drive assignments within your program. Instead, allow the user to specify the drive(s) to be used.

BACKUP

Purpose:

The BACKUP command makes backup copies of one or more files from a hard disk onto a diskette.

Syntax:

BACKUP [<d:>][<path>][<filespec>] d:[/S][/M][/A][/D:<date>]

Comments:

Use this command when you want to recover unused space on your hard disk drive, or to create new partitions on the hard disk.

The first parameter you enter is the hard disk file(s) to back up.

The second parameter is the backup disk drive.

Be careful. Unless otherwise specified, the copies of the old files on the backup diskette are erased before the new files are written on it.

The BACKUP command sets exit codes that can be used in a batch processing file with an IF command. These exit codes are as follows:

0	normal completion
1	no files found
2	BACKUP stopped by user
3	BACKUP stopped by error.

Files duplicated with the BACKUP command can only be used by the RESTORE command to restore a hard disk drive's files. Do not use BACKUP files for archiving purposes.

Options:

The following options may be used with the BACKUP command:

/S Back up subdirectories also.

/M Back up only those files that have changed since the last backup.

/A Add the files to be backed up to those already on the backup diskette. This does not erase old files on the diskette.

/D Back up only those files that were last modified on or after a certain date.

BOOT

Purpose:

Allows the user to designate the MS-DOS system boot drive or volume (partition). The value set by BOOT is stored in battery-backed memory.

Syntax:

BOOT [A: | C: | D: | STD | ?]

Comments:

BOOT

Reports the currently selected boot drive value.

BOOT ?

Displays a summary of the operation and purpose of BOOT.

BOOT A:

Instructs the system to boot from diskette (drive A first, followed by drive B if drive A is empty or does not contain a bootable system diskette).

BOOT C:

Instructs the system to boot from the currently active partition on drive C (hard disk unit #0).

BOOT D:

Instructs the system to boot from the currently active partition on drive D (hard disk unit #1).

BOOT STD

Instructs the system to follow the standard boot procedure by searching for a bootable system diskette or volume in the following predetermined order: Drive A, B, C, D. This is the default boot procedure for the system. (On C and D, only the active partitions are searched.)

The designated system boot drive value is erased if a hard disk was designated as the boot drive and a different partition on that drive is activated (via HDSETUP option Activate). BOOT should then be run to designate a new system boot drive.

CHMOD

Purpose:

Change and display file and/or directory attributes.

Syntax:

CHMOD d:[path][filename[.ext]] [+|-S][+|-R][+|-H][+|-A][+|-V]

Comments:

CHMOD is used to change, modify, or list file or subdirectory attributes — the characteristics about the file. The file's attributes can be combinations of the following:

System file — files used by the operating system. Normally these files are hidden from the uses of MS-DOS.

Read-only file — these files can only be read from, not written to.

Hidden file — another type of file hidden from normal use by MS-DOS.

Archive file — a file that has not been backed up. Every time MS-DOS appends or creates a file, this attribute is turned on.

Volume ID — not a file. An 11-character ID name to help in the identification of diskettes.

Directory — not a file. Another directory that has information about other files.

The file attributes are represented as follows:

A — Archive
S — System
R — Read-only
H — Hidden
V — Volume
<dir> — Directory.

Using this utility, you can set or clear any of the file attributes except the volume ID and directory attributes. Global characters are allowed in filenames.

To set an attribute for any file, enter a plus sign (+) after the filename followed by the attribute lettercode. Any lettercode entered without a set or clear (a minus sign) option *sets* the attribute.

To clear an attribute, enter a minus sign (–) followed by an attribute lettercode.

One or more attributes may be entered at any one time; spaces are ignored. If you make a mistake (such as giving an improper attribute or filename), CHMOD displays its options and their proper syntax.

Examples:

CHMOD A:*.*

displays attributes for the current directory on drive A and

CHMOD B:\pathname*.dat

displays attributes for all filenames with the extension .DAT in the subdirectory pathname.

CHMOD diskcopy.exe +h+r

sets the hidden and read-only attributes for the filenames DISKCOPY.EXE.

CHMOD B:\overlays\wsmsgs.ovr -r

clears the read-only attribute from the filename WSMSGS.OVR in the subdirectory OVERLAYS on drive B.

Entering

CHMOD B:*.*

for a system disk with a Volume ID of WP and a subdirectory name OVERLAY displays this on your screen:

```
chmod (c) Phoenix Software Assoc. Ltd. 1983
b:                              io.sys        A S R H .
b:                            msdos.sys       A S R H .
b:                           command.com      A . . . .
b:                                    wp <dir> . . . . .
b:                               overlay <dir> . . . . .
5 files.
```

Screen 5-2 CHMOD Display

NOTES

1. If you run CHMOD improperly, it displays its options and switches and tells you how to use them. CHMOD works only on version 2.00 or higher of MS-DOS.

2. Some switch entry considerations:

A +A + A	Set the Archive attribute. These are all equivalent.
–A+RH –A +RH –A R +H	Clear Archive, set Read-only and Hidden. As above, note that the order of switch entries and spaces does not matter.
–A+A	Sets Archive. The last entry on a command line is always used by CHMOD.

Entering only <filename[.ext]> lists all of the attributes for the files, without changing them.

COMP

Purpose:

The COMP command compares the contents of a file or group of files with others to verify that they are identical.

Syntax:

COMP [<pathname1> [<pathname2>]]

Comments:

<pathname1> is the file or group of files that is to be compared with that specified in <pathname2>.

More than one file may be specified if you use wild card characters. Only files that have names matching those specified in <pathname1> are compared.

Files may be on either the same or different drives. Files may be in the same or different directory.

You must enter **[<pathname2>]** for this command to perform as expected.

If the files to be compared are identical, the following message appears on your screen:

```
Files compare OK
Compare more files (Y/N)?
```

Enter **N** to stop the COMP command. Enter **Y** to repeat the procedure with another set of files.

If more than one file is being compared, the COMP process continues until all files have been compared.

The COMP command displays an error message if one of these problems occurs:

- a specified directory path is invalid
- two files to be compared are of a different size
- a file specified by pathname2 cannot be found.

An advisory message is displayed if, in the same location of two compared files, the data does not match. The message indicates the offset in bytes (within the files) and the contents of those sections of the files.

If 10 data mismatches are found, the COMP command halts and displays this message:

10 mismatches — ending compare

If an end-of-file (EOF) marker is not found at the end of a COMP command process, this message appears on your screen:

EOF mark not found

Some application programs use files that are recorded in exact 128-byte multiples. Sometimes the actual data in these files may be less than exactly 128 bytes, and the COMP program finds mismatches at the end of these types of files.

If the EOF message appears on your screen, it does not necessarily mean that there is a problem. It may be telling you that compare errors may not have occurred in the usable data portion of that file.

DISKCOMP

Purpose:

Compares the contents of the diskette in the first-specified drive to the contents of the diskette in the second-specified drive. Usually, you would run DISKCOMP after a DISKCOPY operation to ensure that the two diskettes are identical.

Syntax:

DISKCOMP [d:] [d:] [/1] [/8]

Comments:

You can specify the same drive or different drives in this command. If you specify the same drive, a single-drive comparison is performed.

/8 causes DISKCOMP to compare only 8 sectors per track.

/1 causes DISKCOMP to compare only one side of the disk.

These options are used when comparing disks formatted with the /8 or /1 option (see FORMAT for details).

DISKCOPY

Purpose:

The DISKCOPY command copies all of the files on the source disk to a destination disk. The diskettes must be in separate drives unless your computer has a single diskette drive.

Syntax:

DISKCOPY [d:] [d:]

Comments:

The first modifier is the source drive, the second is the destination drive.

With a single-drive computer: You are prompted to insert diskettes at the appropriate times. DISKCOPY pauses between insertions until you press any key before continuing.

After copying, DISKCOPY prompts

Copy complete
Copy another (Y/N)?

To copy another diskette, enter **Y**. To end the COPY, enter **N**.

NOTES

1. If you omit both options, a single-drive copy operation is performed on the default drive.

2. If you omit the second option, the default drive is used as the destination drive.

3. Both disks must have the same number of physical sectors, and those sectors must be the same size.

4. Disks that have had a lot of file activity (additions and deletions) are fragmented, because space on the disk is no longer sequential. The first free sector found is the next sector allocated, regardless of its location.

   A fragmented disk performs slowly due to delays from finding, reading, or writing a file. Use the COPY command to copy a diskette that has had a lot of activity. For example,

   COPY A: *.* B:

   copies all files from the disk in drive A to the disk in drive B sequentially, eliminating the fragmentation of space.

5. DISKCOPY automatically determines the number of sides to copy, based on the source drive and disk.

FORMAT

Purpose:

FORMAT prepares a diskette or hard disk to receive data from the computer. The diskette or hard disk must be formatted before it can be used.

Syntax:

FORMAT [d:][/O][/V][/8][/1][/S]

Comments:

FORMAT initializes the directory and file allocation tables on the specified drive. If no drive is specified, the diskette in the default drive is formatted.

Options:

/O causes FORMAT to produce an MS-DOS version 1.x compatible disk. The /O option causes FORMAT to reconfigure the directory with an OE5 hex byte at the start of each entry so that the disk may be used with 1.x versions of MS-DOS, as well as MS-DOS 2.0.

This option should be given only when needed because it takes a fair amount of time for FORMAT to perform the conversion, and it noticeably decreases version 1.x and 2.0 performance on disks with few directory entries.

/V causes FORMAT to prompt for a volume label after the disk is formatted.

If the /8 option is used, the specified disk will be formatted 8 sectors per track. This decreases disk capacity to 320K.

If the /1 option is used, the specified disk will be formatted single-sided. This cuts disk capacity in half.

The /8 and /1 options are used when making backup copies of disks formatted under early versions of MS-DOS (1.xx); these disks usually have either 160K or 320K capacities.

/S, if used, must be the last entry on the command line. /S copies the hidden SYS files onto the diskette or hard disk.

The files are copied in the following order:

IO.SYS
MSDOS.SYS
COMMAND.COM

GRAPHICS

Purpose:

The GRAPHICS command enables you to print any graphics displayed on the screen, if you have a graphics-compatible printer attached to your computer.

Syntax:

GRAPHICS

Comments:

After loading GRAPHICS into the memory of your computer, press and hold **Shift** and press **Prt Sc** to direct the graphics displayed on the screen to the graphics-compatible printer.

The GRAPHICS command defaults to an IBM-compatible printer interface. This is the same interface that a Pinwriter P2-3/P3-3 printer has. (Use the MODE command to set other interface parameters that may be required for your own printer.)

If color graphics are used, the screen image is printed in up to four shades of gray.

Use interrupt #5 (INT5) to print the screen from a program.

HDSETUP

Purpose:

Initializes and partitions the hard disk into variably sized volumes.

Syntax:

HDSETUP [?]

Comments:

HDSETUP ?

Displays a summary of the purpose and operation of HDSETUP.

HDSETUP

Displays the current hard-disk partition table followed by a menu listing these options:

Activate — Chooses the active MS-DOS partition.
Create — Creates an MS-DOS partition.
Delete — Deletes an MS-DOS partition.
Format — Formats the specified tracks.
Select — Selects the hard disk unit number.
Exit — Exits the HDSETUP program.

Select these options by typing the first letter of the option. **HDSETUP** then displays prompts for inputting any required parameters. A complete description of the steps necessary to set up a hard disk, including examples, is provided in Chapter 4 of this document.

NOTE

After a hard disk has been selected as the system boot drive (via the BOOT utility or the function key method), creating or deleting a partition, or activating a different partition on that drive voids the selection. After exiting HDSETUP, run the BOOT utility to select the boot unit.

MODE

Purpose:

The MODE command lets you define some of the operating characteristics of your computer. There are three different uses of MODE.

Syntax:

To set communication protocol for the RS-232C serial interface port:

MODE COMn:baud[,parity[,databits[,stopbits[,p]]]]

To set the type of display you are using and how many characters are displayed on a single line:

MODE n

To set printer parameters or to redirect printer output to the RS-232C serial interface port:

MODE LPT1: [chars][,spacing]
or
MODE LPT1=COMn

Setting Communication Protocols

MODE COMn:baud[,parity[,databits[,stopbits[,p]]]]

When you are setting the communication protocol for your serial interface port, you must specify which port you are setting and the speed (baud rate) you want to use. Parity, databits, and stopbits entries are optional. You may also specify that the serial port continuously attempt to make and maintain contact with a printer or telephone coupler following time-out errors.

The syntax element **n** must be entered as either **1**, **2**, or **3**: 1 is the built-in serial interface port; 2 and 3 refer to the optional Dual Port RS-232C Interface board.

The syntax element baud is the baud rate that the serial port uses to communicate. Only the first two digits of the baud rate need to be entered. The baud rates are 150, 300, 600, 1200, or 2400.

Parity setting is optional. The entry may be either **e** (even parity), **o** (odd parity), or **n** (no parity). The default is even parity.

Databits are an optional entry. The default value is 7. You may enter either **7** or **8** for the number of databits in a character.

Stopbits are an optional entry. You may enter either **1** or **2** for the number of stopbits at the end of a character. The default value is 2 stopbits if the baud rate is 110. The default value for all other baud rates is 1 stopbit.

The **p** entry in the command line is optional. If it is included, your serial interface port continuously retries to send if time-out errors occur. Some types of printers may not match the timing requirements of your serial port. In most cases, the **p** option overcomes this problem.

Examples:

MODE COM1:24

This form of the MODE command sets the baud rate to 2400 for the built-in serial interface port. All other entries are set to their default values.

MODE COM1:1200,N,1,P

This form of the MODE command sets the built-in serial port to 1200 baud, no parity, one stop bit, and continuous retry on time-outs. This command format might be used with a high-speed telephone coupler.

Setting Display Characteristics

MODE n

Use this form of the MODE command to set the display type and format for the APC III screen. This format of the command requires an entry called an argument. Arguments are values that tell the computer what option you want.

Options:

40	Sets the width of the display line to 40 characters.
80	Sets the width of the display line to 80 characters.
BW40	This sets the display mode to black and white with 40 characters per line.
BW80	Same as above, only 80 characters per line.
CO40	This sets the display mode to color and to 40 characters per line.
CO80	Same as BW80, but color mode is set.
MONO	Same as BW80.

Setting the Printer Characteristics and Selecting the Printer Port

MODE LPT1: [chars][,spacing]
MODE LPT1=COMn

LPT1 is the device name for the parallel printer port in your APC III.

The first example above lets you set the number of characters per line that your printer prints and the vertical spacing between lines of output. For example,

MODE LPT1: 132,6

Passes the instructions to the printer to print 132 characters per line and 6 lines per inch.

Some printers do not accept this type of command.

Check the user's manual that comes with your printer for more information.

In the second example above, you reassign the printer output port to be a serial interface port in your computer. You may want to do this if you have a special printer for correspondence-quality output or graphics attached to your computer.

For example,

```
MODE LPT1=COM2
```

redirects all printer output to the first of two serial ports found on the optional Dual Port RS-232C Interface board.

NOTE

In some cases you may need two MODE commands to set up the serial interface port for use with a printer. For example,

```
MODE LPT1: 2400,E,1,P
MODE LPT1=COM1
```

would be required to set the printer port baud rate to 2400, even parity, 1 stop bit and continuous retry. The second MODE command redirects the output using the new settings to the built-in serial port in your computer.

RESTORE

Purpose:

Restores files from backup diskettes to the original hard disk volume.

Syntax:

RESTORE <d:> [<d:>][<path>][<filespec>][/S][/P]

Comments:

The first parameter you specify is the drive designator of the disk containing the backed-up files. The second parameter is the file specification indicating the files you want to restore.

Options:

/S Restore subdirectories also.

/P If any hidden or read-only files match the file specification, prompt for permission to restore them.

If /P is omitted, all hidden and read-only files are copied.

RETRACT

Purpose:

Retracts the access arm of the hard disk unit to its safe landing area.

Syntax:

RETRACT

Comments:

Retracts the heads of all hard disk units attached to the APC III. RETRACT should always be run before shutting off power to a hard disk system to prevent possible loss of data and excessive head wear.

SIZE

Purpose:

Displays the file sizes and diskette space required to contain specified files. Sums up the total size and number of all the files. It is most useful for copying large numbers of files from hard disk to diskettes to see if the specified files will fit on the destination disks.

Syntax:

SIZE [d:][path][filename[.ext]] [d:]

Comments:

Use SIZE with a path or filename. Global characters are permitted. If no parameter is entered, then SIZE defaults to all files in the current directory.

Examples:

Enter

SIZE \BIN*.COM

to obtain a list of all files with the extension .COM in subdirectory BIN. Your screen displays the following.

```
size (c) Phoenix Software Assoc. Ltd. 1983
                        chkdsk.com       6468
                       diskcopy.com      3510
                         format.com      7020
                           comp.com      2845
4 files, total of 19843 bytes.
```

Screen 5-3 SIZE Display of .COM Files

Enter

SIZE *.* B:

to obtain a list of exact file sizes, the amount of disk space on B needed by each file, plus the total amount of disk space needed for all files. Your screen displays the following.

```
size (c) Phoenix Software Assoc. Ltd. 1983
                      suprascl.mun      23936   ->      24576
                        phellb.doc       3584   ->       4096
                      psautill.doc      44032   ->      44032
                       spradvr.doc       4096   ->       4096
                        testln.txt        694   ->       1024
                            lst.txt         0   ->          0
                      suprasgn.doc      31744   ->      31744
 7 files, total of 108086 bytes, (109568) bytes disk space required on B:
```

Screen 5-4 SIZE Display of All Files on Drive B

NOTES

1. If drive is specified as second argument, then the cluster size on the specified drive is used. There must be a diskette in the specified drive.

2. If you want to list the files in another directory, you must also enter enter a filename. The filename can be a global. Entering

   SIZE A:\PATH

   without a filename causes SIZE to return the number of files and sizes as zero.

TREE

Purpose:

The TREE command lets you view the directories and paths on a specified drive. TREE also lists the files in each directory.

Syntax:

TREE [drivespec:][/F]

Comments:

The command modifier [drivespec:] is the diskette or hard disk drive that contains the directories to be displayed.

For each directory on the specified drive TREE displays

- the directory path starting from the root directory
- the subdirectories within the directory
- optionally, the files in each directory.

Option:

/F The /F option displays the filenames and file specifications in each directory.

xTREE

Purpose:

Displays all of the subdirectories, and optionally, files within the directory, found on the specified drive. The display starts with the current directory and continues down through the subdirectory structure.

Syntax:

xTREE[d:][filename[.ext]] [/A][/D][/Q]

Comments:

If no drive is specified, the default drive is assumed.

For each directory found, its full pathname is displayed, along with names of any directories defined within it. (These are called subdirectories in the output.) If the /F parameter is used, the names of all files in each subdirectory are also displayed.

To make the screen output pause, use the **Ctrl-Num Lock** keys, or pipe the output to the MORE filter.

Examples:

In this example, the command

xTREE B:/F > TREE.LST

lists all directories on drive B. The output is placed in file TREE.LST in the current directory of drive B and contains the names of all subdirectories and files at each directory level.

Here is an example of a directory path listing. Assume that the disk called SYSTEM in drive A had the following directory and file structure.

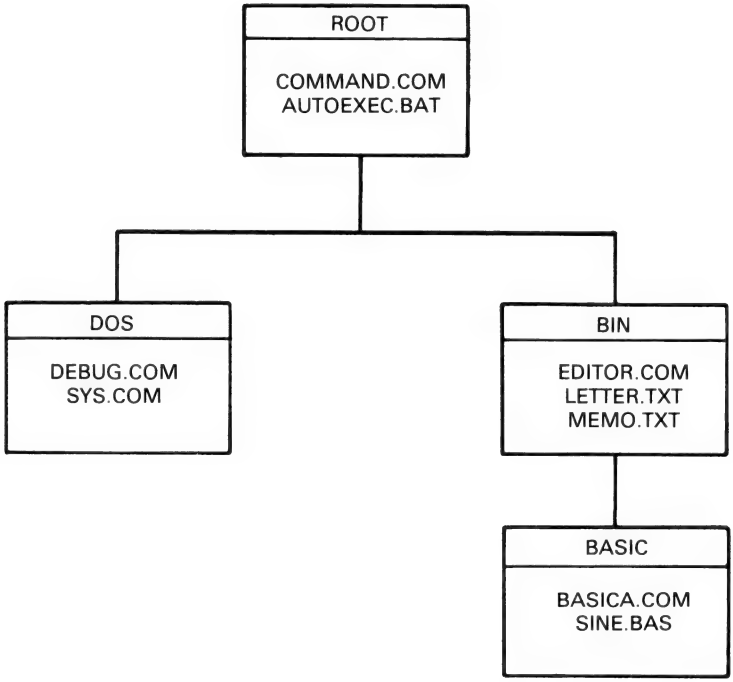
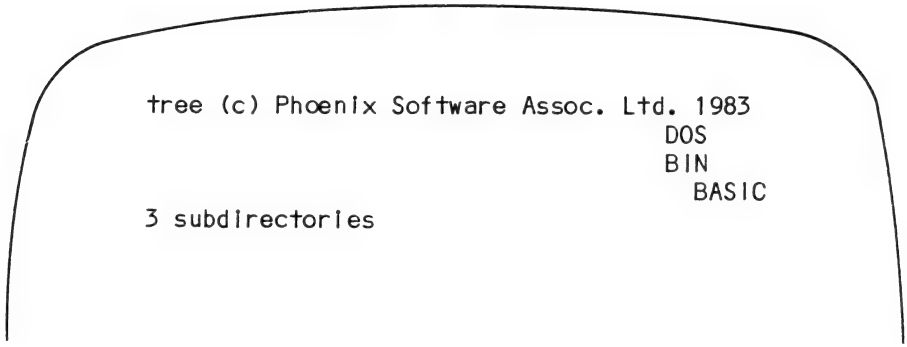


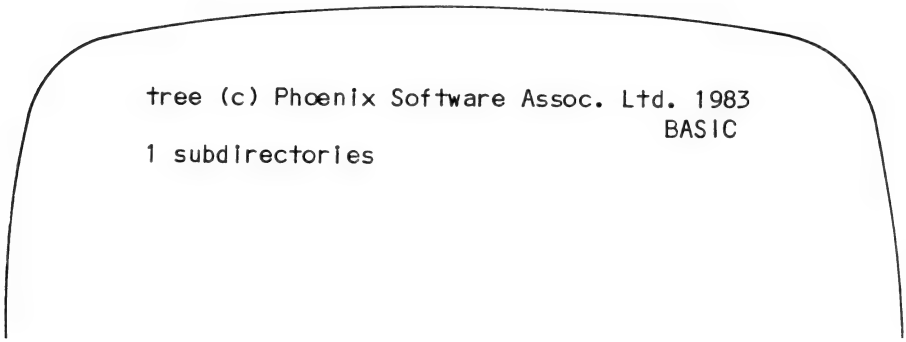
Figure 5-1 Disk Directory and File Structure

Entering **xTREE** from the root directory causes the screen to display the following.



Screen 5-5 xTREE Display from Root Directory

If you had been in the BIN directory instead of the root directory, the screen would have displayed the following.



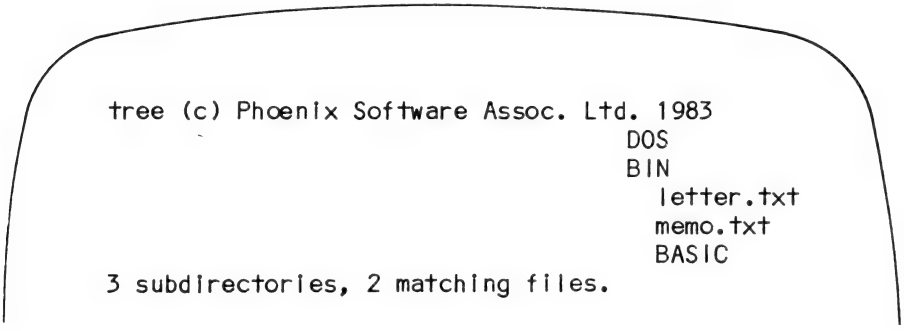
Screen 5-6 xTREE Display from \BIN Directory

This is because xTREE works from the current directory down to the lower level it finds. It never looks "up" the tree.

xTREE can also display specified files. If a file called LETTER.TXT exists on the disk, instead of changing directories and doing a DIR, you could go to the root and enter

xTREE *.txt

The screen will display as follows.



Screen 5-7 xTREE Display of .TXT Files

If the file is found, it is listed in lowercase to distinguish it from directory names, which always appear in uppercase.

Options:

xTREE has three switches that change the way it works.

/A Archive files.
/D Delete files.
/Q Question before every delete.

/A lists only files with the Archive attribute set.

Whenever you modify a file in any way, MS-DOS sets the A attribute to mark it as "changed." Programs like BACKUP use this in determining what files need to be backed up. You can determine what files you have changed in any way on your disk by entering (from the root):

xTREE *.*/A

/D and /Q work together. A /D after the filename tells xTREE to delete each file it finds. A typical use for this is for deleting all .BAK files from a hard disk with many subdirectories, where it is tedious to enter each directory manually. Done once a week or so after backing up, this allows you to free up hundreds of kilobytes in .BAK files alone.

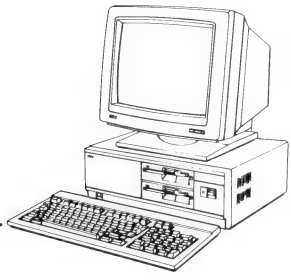
/Q makes MS-DOS prompt "Delete? (Y/N)" appear before actually deleting the files it finds. Use /Q if you aren't sure you want to delete all of a type of file with /D.

/Q is necessary if you enter ***.*** as a filename; this prevents xTREE from deleting all files in all subdirectories.

xTREE *.BAK/D	Deletes all .BAK files found.
xTREE *.BAK/D/Q	Deletes each .BAK file; requires you to enter **Y** as verification.

You can also specify a disk drive in the usual manner. **xTREE D:** lists all the directories on drive D.

Please note that you can enter a full path specifier for xTREE, like \bin*.com. xTREE ignores the \bin\ part, and uses only the filename, as mentioned above. It does not find only the specified files in \bin\.



Appendix A

APC III Hardware

MICROPROCESSOR UNIT (MPU)

The APC III uses an 8086-2 processor, operating at a clock speed of 8 MHz. The standard configuration includes 128K of read/write semiconductor random access memory (RAM), and 32K of read-only memory (ROM). The ROM contains a program called the Basic Input/Output System (BIOS), a self-check routine, and a ROM loader, which is used in the system bootstrap process when an operating system is loaded from diskette.

Additional semiconductor memory can be added in increments of 128K, up to a total of 640K. Memory is added via circuit boards plugged into the APC III expansion bus.

DISKETTE DRIVES

The APC III uses either one or two double-sided, double-density 5¼-inch diskette drives, depending on the system configuration. Each drive has a formatted capacity of 360K. Some software packages are distributed on 160K formatted diskettes. These diskettes can also be read from and written to by these drives.

HARD DISK DRIVES

The APC III may have, as options, one or two 5¼-inch hard disk drives. A single hard disk can either be mounted internally, or be a separate external device. A system with two hard disks can have either one external, or two external drives.

RS-232C SERIAL COMMUNICATIONS INTERFACE

The standard APC III system comes equipped with an RS-232C-compatible serial communications port. It can be programmed under software control for baud rates from 150 to 2400; with 1 or 2 stop bits; even, odd, or no parity; and from 5 to 8 data bits. The port, recognized by the SLE MS-DOS system as the COM1 device, can be used to connect the APC III to a variety of modems, peripherals, or other computers.

The Dual Port RS-232C option board provides two additional serial ports to the system. These ports, recognized by the SLE MS-DOS system as COM2 and COM3, have the same capacity as the standard port.

8087 NUMERIC DATA COPROCESSOR

The SLE board contains a socket for an 8087-2 numeric data coprocessor. Some math-intensive application programs may take advantage of this device to increase the computational speed of the APC III. While the APC III MPU board also contains a socket for an 8087, if any software operating under the SLE requires an 8087, it must be added to the SLE board, not the MPU board.

BOARDS

SLE Board

The SLE board provides access to software that would not otherwise function on the APC III. To accomplish this goal, the SLE board uses an 8086-2 processor, operating at a clock speed of 8 MHz, and a special set of programs located in an on-board ROM. This programming translates the SLE mode software into a form that the APC III can understand, and then transfers the new software to the standard 8086 processor of the APC III. Thus, the two 8086 processors operate together in a way that is transparent to the computer user.

Color Graphics Board

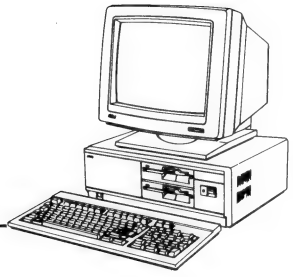
The APC III comes with monochrome graphics. However, to take advantage of all of the SLE's graphics capabilities, you must install the Color Graphics board on the APC III. The Color Graphics board provides access to software employing the standard 320 × 200 color graphics resolution.

Unsupported Boards

The Joystick/Sound board and GPIB board are currently *not supported* in SLE mode. They are supported in Specialized mode.

PC-UX Memory Management Board

You must not use the Software Library Expander when the PC-UX Memory Management board is installed in your APC III. Remove the PC-UX Memory Management board before installing the SLE board in the APC III.



Appendix B

CRT Display

The APC III can display text or graphics in either monochrome or color.

TEXT

The text display, held in 8K of video random access memory (VRAM), offers either 25 lines of 80 characters each (2000 characters), or 25 lines of 40 characters each (1000 characters).

When one of the character modes is active, each character may be displayed in one of 8 colors against a black background. In addition, each character may be displayed in reverse (black character against a color background), blinking or underlined. Character colors may easily be changed using the appropriate ANSI escape sequence.

On monochrome monitors, the colors are represented by shades of gray. It is not possible to change the background color of an individual character.

CRT Displayed Character Set

Figure B-1 illustrates the displayed character set for the APC III. The two-digit hexadecimal code for any character can be found by taking the number in the top row as its first digit, and the number in the left column as its second digit. The characters are defined by the contents of an internal hardware character-generator ROM.

Certain characters cannot be displayed through the CON device driver because they have special meanings. For example, the character code 13 (decimal) is reserved for carriage return. The console driver will intercept these characters and act on them, rather than place them in VRAM.

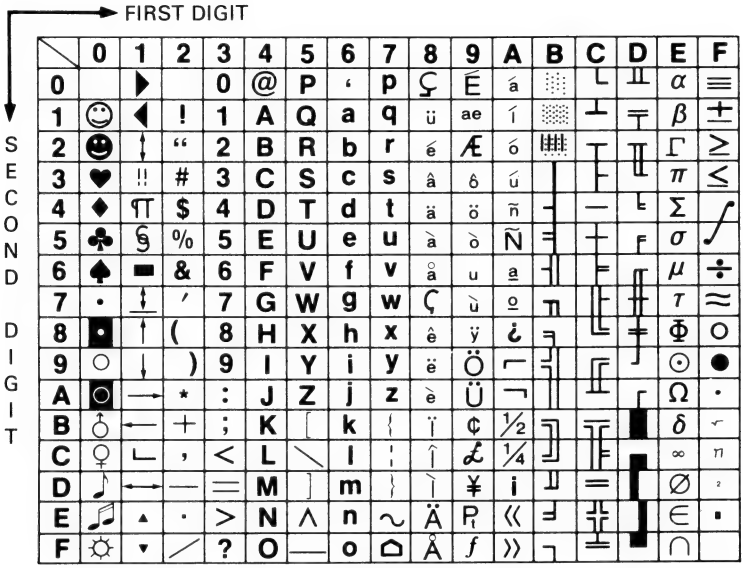


Figure B-1 APC III Displayable Character Set

GRAPHICS

In addition to the text modes, several graphics modes are available to the SLE system:

320 × 200 pixel monochrome

320 × 200 pixel color

640 × 200 pixel monochrome

NOTE

The APC III comes with monochrome graphics. Color/graphics capabilities require the installation of the Color Graphics board, which provides access to software employing the standard 320 × 200 color graphics resolution.

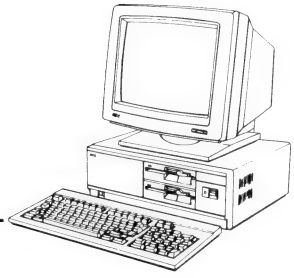
In addition, a color monitor is required for color display. If a monochrome monitor is used with the Color Graphics board, the colors in the color palette will be displayed as white, light gray, and dark gray against a black background.

The 320 × 200 pixel color mode can display each pixel in one of four colors taken from two palettes. When the 320 × 200 graphics mode is active, one of two color "palettes" may be chosen, each containing three colors against a user-definable background:

	Palette 1	Red, Green, Yellow
or		
	Palette 2	Cyan, Magenta, White

The 640 × 200 graphics mode is a monochrome (white on black) display.

The text and graphics modes may be set either by sending the appropriate ANSI escape sequence to the display device, by executing a ROM BIOS call (interrupt 10 hex), or by setting the display controller directly. For a description of the ANSI escape sequences, see Appendix C.



Appendix C

ANSI.SYS

Many applications running under the Software Library Expander require a simple way to perform the following functions:

- position the cursor
- erase text
- set the display mode (to display characters or graphics)
- control display colors and attributes
- define keyboard key functions.

Since these requirements are common to many computer applications, a standard definition for these functions has been devised. These standard functions are provided to MS-DOS (and so to the applications) by ANSI.SYS.

The ANSI.SYS file is included on the Software Library Expander distribution diskette. Note that the ANSI.SYS file used with the Software Library Expander in SLE mode is different from that used with the APC III Specialized mode. This is because the display capabilities of Specialized mode (such as graphics resolution) are different from those of SLE mode. Do not interchange the two different ANSI.SYS files.

To make the standard functions provided by ANSI.SYS available to MS-DOS, MS-DOS must be informed of the existence of ANSI.SYS. This can be accomplished by placing the command,

DEVICE=ANSI.SYS

in your CONFIG.SYS (configuration) file. A complete description of the configuration file is contained in Appendix D of the *MS-DOS User's Guide*.

The following ANSI.SYS functions are described below:

Cursor Control

CUP	Cursor Position
CUU	Cursor Up
CUD	Cursor Down
CUF	Cursor Forward
CUB	Cursor Backward
HVP	Horizontal and Vertical Position
DSR	Device Status Report
CPR	Cursor Position Report
SCP	Save Cursor Position
RCP	Restore Cursor Position

Erasing

ED	Erase Display
EL	Erase Line

Display Mode

SGR	Set Graphics Rendition
SM	Set Mode
RM	Reset Mode

Key Assignment

The descriptions of the ANSI control sequences use the following syntax:

1. The default value is used when no explicit value, or a value of zero, is specified.
2. Pound sign, #, means a numeric parameter; this is a decimal number specified with an ASCII character.
3. ESC refers to the one-byte code for escape (hex 1B), not the three characters "ESC".

CURSOR CONTROL

Cursor Position

CUP	Function
ESC [#;#H	Moves the cursor to the position specified by the parameters. The first parameter specifies the line number and the second parameter specifies the column number. The default value is 1. If no parameter is given, the cursor is moved to the home position.

Cursor Up

CUU	Function
ESC [#A	Moves the cursor up one line without changing columns. The value of # determines the number of lines moved. The default value for # is 1. This sequence is ignored if the cursor is already on the top line.

Cursor Down

CUD	Function
ESC [#B	Moves the cursor down one line without changing columns. The value of # determines the number of lines moved. The default value for # is 1. The sequence is ignored if the cursor is already on the bottom line.

Cursor Forward

CUF	Function
ESC [#C	Moves the cursor forward one column without changing lines. The value of # determines the number of columns moved. The default value for # is 1. This sequence is ignored if the cursor is already in the rightmost column.

Cursor Backward

CUB	Function
ESC [#D	Moves the cursor back one column without changing lines. The value of # determines the number of columns moved. The default value for # is 1. This sequence is ignored if the cursor is already in the leftmost column.

Horizontal and Vertical Position

HVP	Function
ESC [#;#f	Moves the cursor to the position specified by the parameters. The first parameter specifies the line number and the second parameter specifies the column number. The default value is 1. If no parameter is given, the cursor is moved to the home position (same as CUP).

Device Status Report

DSR	Function
ESC [6n	The console driver will output a CPR sequence on receipt of DSR (see below).

Cursor Position Report

CPR	Function
ESC [#;#R	The CPR sequence reports the current cursor position through the standard input device. The first parameter specifies the current line and the second parameter specifies the current column.

Save Cursor Position

SCP	Function
ESC [s	The current cursor position is saved. This cursor position can be restored with the RCP sequence.

Restore Cursor Position

RCP	Function
ESC [u	Restores the cursor to the value it had when the console driver received the SCP sequence.

ERASING

Erase in Display

ED	Function
ESC [2J	Erases all of the screen; the cursor goes to the home position.

Erase in Line

EL	Function
ESC [k	Erases from the cursor to the end of the line including the cursor position.

MODE OF OPERATION

Set Graphics Rendition

SGR	Function
ESC [#;...;#m	Sets the character attribute specified by the parameter(s). All following characters will have the attribute specified by the parameter(s) until the next occurrence of SGR. Parameter — Meaning 0 — All attributes Off (normal white on black) 5 — Blink On 7 — Reverse video On 8 — Cancelled On (invisible) 30 — Black foreground 31 — Red foreground 32 — Green foreground 33 — Yellow foreground 34 — Blue foreground 35 — Magenta foreground 36 — Cyan foreground 37 — White foreground

Set Mode

SM	Function
ESC [=#h	Invokes the screen width of type specified by the parameter. Parameter Meaning 0 40 × 25 black and white 1 40 × 25 color 2 80 × 25 black and white 3 80 × 25 color 4 320 × 200 color 5 320 × 200 black and white 6 640 × 200 black and white 7 wrap at end of line (typing past end-of-line results in new line).

Reset Mode

RM	Function
ESC [=#1	Parameters are the same as SM (Set Mode) except that parameter 7 will reset wrap at end-of-line mode (characters past end-of-line are thrown away).

KEYBOARD KEY REASSIGNMENT

The control sequence is	Function
ESC [#;#;...#p or **ESC ["string";p** or **ESC [#;"string";#; #;"string";#p** or any other combination of strings and decimal numbers	The first ASCII code in the control sequence defines which code is being mapped. The remaining numbers define the sequence of ASCII codes generated when this key is intercepted. However, if the first code in the sequence is zero (NUL), then the first and second code make up an extended ASCII redefinition.

Here are some examples:

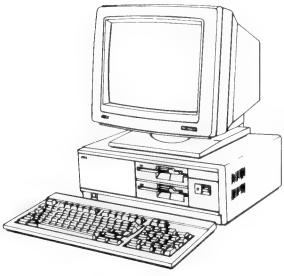
1. Reassign the **Q** and **q** key to the **A** and **a** key (and the other way as well):

   ESC [65;81p A becomes Q
   ESC [97;113p a becomes q
   ESC [81;65p Q becomes A
   ESC [113;97p q becomes a

2. Reassign the **F10** key to a **DIR** command followed by a carriage return:

   ESC [0;68;"dir";13p

   The 0;68 is the extended ASCII code for the **F10** key; 13 decimal is a carriage return.



Appendix D

RAMDISK

Purpose

Turns the RAMDISK option on or off, and sets the size of the RAMDISK. RAMDISK is a device driver, not a utility.

Use RAM as a storage device.

Syntax

DEVICE=RAMDISK.DEV nnn

Comments

To use the RAMDISK feature, insert the following line into the CONFIG.SYS file on your boot disk using a text editor such as edlin. Note: nnn = size of virtual RAMDISK in K (1024) bytes.

DEVICE=RAMDISK.DEV nnn

Make sure to copy the file RAMDISK.DEV to the boot disk. When you start the computer, the number of disk drives is determined from the internal switch settings, and the RAMDISK becomes the "next" drive letter.

Index

A

ANSI escape sequence, B-1, B-3, C-3—C-12
ANSI.SYS file, 4-20, C-1—C-12
APC III
  expansion bus, A-1
  hardware, A-1
  keyboard, 3-1—3-2
applications
  installing, 2-5
  non-MS-DOS, 2-5
  running, 2-4
ASSIGN utility, 5-9
xASSIGN utility, 5-10—5-12
AUTOEXEC.BAT file, 5-9

B

backing up diskettes, 2-8, 2-10
  copying diskettes, 2-8, 2-9—2-10, 2-11
  formatting diskettes, 2-8—2-9, 2-11, 2-12
BACKUP utility, 5-13—5-14
.BAK files, 5-41
baud rates, 5-29, A-2
BIOS (Basic Input/Output System), A-1
booting, 2-11
  from diskette, 4-21
  from hard disk, 4-20—4-21
Bootstrap
  Loader program, 2-11
  process, A-1
BOOT utility, 4-1, 5-15, 5-27
braces, 5-5
brackets
  angle, 5-5
  square, 5-5

C

CHKDSK utility, 1-4
CHMOD utility, 5-16—5-18
color graphics, 5-26
  monitor, 2-5
Color Graphics board, 1-4, 2-5, A-3, B-3
COMMAND.COM (command processor), 2-6, 4-20, 5-25
  automatic reloading of, 2-6—2-7
command line template editing keys, 3-8
COMP utility, 5-19—5-20
CON (device driver), B-1
CONFIG.SYS, 4-20
conventions, 1-6
copying a diskette, 2-8, 2-9—2-10, 2-11
CRT display, B-1
  graphics, B-2—B-3
  text, B-1

CRT-displayed character set, B-1—B-2

D
Delete option, 4-19—4-20
"*other*" operating systems, 4-19
destination (target) drives, 5-4
device driver
RAMDISK, D-1
device name
differences, 5-3
RS-232C communications interface, A-2
DIR command, 5-6, 5-7, 5-8
directory path listing, 5-38
DISKCOMP utility, 5-21
DISKCOPY utility, 5-22—5-23
diskette
drives, A-1
bootable, 2-11
disk (hard) drives, A-1
Dual-Port RS-232C Interface board, 5-28, 5-31

E
8086 processor, A-3
8086-2 processor, A-1, A-3
8087 numeric data coprocessor, A-2
8087-2 numeric data coprocessor, A-2
ellipsis, 5-5
exiting from SLE mode, 2-6

F
filter, 5-7
FIND, 5-7
MORE, 5-7
SORT, 5-7
FIND filter, 5-7
formatting
diskette, 2-8—2-9, 2-11, 2-12
Format option, 4-19
FORMAT utility, 2-11, 4-1, 4-19, 5-24—5-25
hard disk, 4-5—4-8

G
GPIB board, A-3
graphics modes, B-2—B-3
GRAPHICS utility, 5-26

H
hard disk, 4-1—4-21
custom utilities, 4-1
disk drive designators, 4-2
drives, A-1
formatting, 4-7—4-8
partitions, 4-2—4-4, 4-9—4-17
preparation, 4-5
10-MB, 4-3
HDSETUP options
Activate, 4-5, 4-17, 5-27
Create, 4-5, 4-9, 5-27
Delete, 4-18, 4-19—4-20, 5-27
Exit, 4-18, 5-27
Format, 4-5, 5-27
Select, 4-20, 5-27
HDSETUP utility, 4-1, 4-2, 4-5, 4-8, 4-9, 4-15, 4-17, 5-27

I
IBM-compatible printer interface, 5-26
IF command, 5-13
installing application software, 2-5
IO.SYS, 4-20, 5-25

J, K, L
Joystick/Sound board, A-3
keyboard, 3-1—3-9
keypad
  stickers, 3-3
  template, 3-3, 3-4
loading, 2-11

M
memory
  requirements, 1-4
  semiconductor, A-1
microprocessor unit (MPU), A-1
MODE utility, 5-28—5-31
monitor
  color graphics, 2-5
  monochrome, 2-5
MORE filter, 5-7, 5-8
MPU board, A-2
MS-DOS commands
  entry, 5-5
  information common to, 5-3—5-4
  standard, 5-1
  syntax, 5-5
MS-DOS Software Library Expander template, 3-3
MSDOS.SYS, 4-20, 5-25

N, O
non-MS-DOS software
  running, 2-5
Num Lock, 3-3, 3-4, 3-5, 3-6
operating system, 1-1
"*other*" operating system
  partitions, 4-2, 4-13, 4-18

P
palettes, B-3
parallel port devices, 5-3
partitioning a hard disk, 4-9—4-17
partitions
  BOBSDOS, 4-11—4-12, 4-13, 4-17—4-18, 4-19
  DOSPART, 4-14
  JIMSACCT, 4-12—4-13
  JIMSGAME, 4-12—4-13
  MS-DOS, 4-2
  MSDOSPAR, 4-9—4-10
  "*other*" 4-2, 4-15
  PC-UX, 4-2, 4-3, 4-15, 4-16, 4-17
PC-UX
  installing on the hard disk, 4-4
  Memory Management board, 2-1, 4-3, 4-17, A-3
  note, 4-16
Phoenix Software Associates, 5-18, 5-34, 5-35, 5-39, 5-40
Pinwriter P2-3/P3-3 printer, 5-26
pipeline, 5-8
pipes, 5-6
piping
  commands and filters, 5-8
powering-on the system, 2-1
printer
  IBM-compatible printer interface, 5-26
  Pinwriter P2-3/P3-3 printer, 5-26

R
RAM (random access memory), A-1, D-1

RAMDISK (device driver), D-1
READ.ME file, 2-6
Release Bulletin, 1-6
reserved file names
  for serial and parallel port devices, 5-3
RESTORE
  command, 5-13
  utility, 5-32
RETRACT utility, 4-1, 5-33
ROM, A-1, B-1
ROM BIOS call, B-3
RS-232C Interface board
  dual-port, 5-28, 5-31, A-2
RS-232C serial communications interface, 5-28, A-2

S
semiconductor memory, A-1
serial port devices, 5-3
SIZE utility, 5-34—5-35
SLE board, 1-1, A-3
  installing, 2-1
SLE mode MS-DOS, 1-2
  exiting from, 2-6
  used to run application programs, 1-1, 1-2
SLE MS-DOS system
  booting from hard disk, 2-2
  diskette loading, 2-2
SLE MS-DOS utilities, 5-1—5-41
  summaries of, 5-2
software
  maintenance procedures, 2-8—2-11
  MS-DOS, 2-4
  package, 2-4
Software Library Expander (*See* SLE board, SLE mode MS-DOS, SLE MS-DOS system, SLE MS-DOS utilities.)
SORT command, 5-6, 5-7, 5-8
source drives, 5-4
Specialized mode MS-DOS, 1-2
  used to run NEC-specific programs and utilities, 1-3
storage devices, 1-1
SYS files, 5-25
system memory, 1-4, 2-6
system self-check, 2-2

T
target (destination) drives, 5-4
templates
  keypad, 3-3, 3-4
  MS-DOS Software Library Expander, 3-3
text modes, B-2
tracks, 4-3
TREE utility, 5-36
xTREE utility, 5-37—5-41

U, V, W
utilities, 5-1—5-41
utility formats, 5-4
vertical bars, 5-5
  pipe separator, 5-7
VRAM (video random access memory), B-1
Wordstar program, 5-10

APC III

NEC
NEC Information Systems, Inc.

USER'S COMMENTS FORM

Document: MS-DOS User's Guide for the Software Library Expander

Document No.: 819-150258-000 Rev. 00

Please suggest improvements to this manual.

Please list any errors in this manual. Specify by page.

From:

Name _____

Title _____

Company _____

Address _____

Dealer Name _____

Date: _____

Please cut along this line.

Seal or tape all edges for mailing - do not use staples.

FOLD HERE

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY CARD

FIRST CLASS PERMIT NO. 105 BOXBOROUGH, MA

POSTAGE WILL BE PAID BY ADDRESSEE

NEC Information Systems, Inc.
Dept: Publications
1414 Mass. Ave.
Boxborough, MA 01719

FOLD HERE

Seal or tape all edges for mailing - do not use staples.

Software Documentation Bulletin

819-095000-425 Rev 01

SLE **Model No. APC-H161**

1.0 Introduction

The SLE (Software Library Expander) is a combination of software and hardware that allows additional popular software packages to run on an APC III computer system. The hardware portion of the SLE is in the form of an option board that plugs into one of the available option slots accessible from the rear of the main system unit. The software portion of the SLE is a combination of MSDOS 2.11, a customized IO.SYS and a special program called SLE.SYS. All of these files are not visible in the directory of the SLE MSDOS SYSTEM DISKETTE but they are necessary in order for the SLE HARDWARE/SOFTWARE set to work properly.

2.0 Contents of the Release

2.1 *Distribution Media* -

SLE MSDOS SYSTEM DISKETTE Rev 01
SLE GWBASIC DISKETTE

2.2 *Documentation*

MSDOS User's Guide for the Software Library Expander
GW-BASIC Guide for the Software Library Expander
SLE MSDOS Template
SLE Keypad Template

3.0 Hardware / Software Requirements

3.1 *Minimum Hardware Requirements*

APC-H101 Monochrome APC-III with 1 FDD with 128 KB memory and SLE Hardware Option Board

3.2 *Minimum Software Requirements*

SLE MSDOS 2.11 for the APC-III

4.0 Installation Procedures

4.1 All installation instructions for the SLE and accompanying software are described in the MSDOS User's Guide for the Software Library Expander in Chapter 2.

4.2 Before booting the SLE MSDOS system for the first time it is advisable to change/replace or add some sections of the SLE MSDOS User's Guide for the Software Library Expander. Please refer to the appendix of this release bulletin for the appropriate documentation revisions.

4.3 Use the TYPE command to view the READ.ME file that is distributed on the SLE MSDOS SYSTEM DISKETTE. This text file contains additional information that was not incorporated into this release bulletin.

5.0 Enhancements

Not Applicable.

6.0 Cautions and Restrictions

6.1 ***Applications Notes***

Following are some considerations and cautions which should be observed while installing and using various applications with the Software Library Expander.

Memory Requirements

It is recommended that your available system memory be 64KB greater than the minimum memory required by a software package. For example, if a word processor requires 384KB of system memory, it is advised to have 512KB installed in your system. This is due to the overhead required by the SLE hardware and software.

FRAMEWORK

FRAMEWORK will not install on an APC III hard disk as described in the FRAMEWORK installation instructions. Instead follow these steps:

1. Set up your hard disk as described in the MSDOS User's Guide.
2. Create a directory to load FRAMEWORK to (e.g. /FW)

3. Copy the entire contents of the FRAMEWORK System disk one and two, tutorial disk, and utility disk to your new directory.

4. Insert FRAMEWORK system disk one in the A disk drive, log on to your new directory (C:/FW), and follow the directions for installing your printer etc, in the FRAMEWORK INSTALLATION INSTRUCTIONS.

5. Anytime you start-up FRAMEWORK, System disk 1 must be in the A disk drive. After FRAMEWORK loads, you may remove the disk.

Since it is not possible to completely install FRAMEWORK to the HARD DISK of the APC III, the DOS ACCESS capability while running directly from the hard disk is not supported as the documentation indicates. The DOS ACCESS capability is limited to briefly exiting the FRAMEWORK "frames" and entering the command line interpreter (COMMAND.COM) of MSDOS. The FRAMEWORK screen will be replaced by a cleared screen and then the standard MSDOS prompt. Data from this screen will not be "IMPORTED" to the DOS Access Frame of FRAMEWORK as is indicated in the documentation. To exit COMMAND.COM, type "exit" at the MSDOS prompt. The FRAMEWORK screen will be redisplayed.

Microsoft Word

Microsoft Word installs as documented in the User's Guide. If, however, you wish to use the Microsoft Mouse (or compatible), the file MOUSE.SYS must be included on your boot disk and the CONFIG.SYS file modified to load the driver. Add the line DEVICE=MOUSE.SYS to CONFIG.SYS to load the mouse driver. When booting, the mouse driver takes approximately 1 minute to install. The system will not give any indication that it is processing. Please be patient. When the mouse driver installs, a message will be displayed indicating whether or not you have a mouse attached. You MUST use the serial version of the Microsoft Mouse with Microsoft Word and the APC III.

6.2 *SLE MSDOS Utilities and ANSI.SYS*

Some of the SLE MSDOS Utilities require that the ANSI.SYS installable device driver be present in order to function properly. The files necessary to automatically install the driver are present on the SLE MSDOS System Diskette, and the utilities will function properly with no special action when this diskette is loaded. Also, any copy of the system diskette created with the DISKCOPY command will automatically load the driver.

Please note, however, that bootable system disks created with the FORMAT /S command will NOT contain the files needed to install the ANSI.SYS driver. If you intend to use the SLE MSDOS Utilities after booting a system disk created with the FORMAT /S command, you must also use the COPY command to copy the CONFIG.SYS and ANSI.SYS files from the SLE MSDOS System Diskette to the new system disk.

6.3 *Non-Volatile System Parameters and Switch SW1-5*

Some of the SLE MSDOS Utilities are used to configure various system parameters by recording the parameter values selected by the user in non-volatile memory. "Non-volatile" means that the APC III will "remember" the values even after the system power is turned off.

When the APC III is shipped from the factory, the contents of the non-volatile memory where the parameters are stored will not necessarily contain valid parameter information. For this reason, one of the ten small ("DIP") switches on the back of the system unit, the one labeled 5, controls whether the system will use the parameter values stored in the non-volatile memory or to use default information when the system is loaded. The positions for switch 5 are:

up: Disregard non-volatile memory parameters: set default parameters into non-volatile memory. (This is the factory setting)

down: Use parameters stored in non-volatile memory.

For proper operation of the MSDOS system, you should boot the system diskette the first time with this switch in the up position. After the system has been booted once, you should change the switch to the down position.

6.4 *Supported Printer Configuration*

The following NEC Printers are supported for use with SLE MSDOS:

Pinwriter P2-3	Spinwriter 2050
Pinwriter P3-3	Spinwriter 3550
Color Pinwriter CP2	Spinwriter 8850
Color Pinwriter CP3	Spinwriter 3530

6.5 *COM3 and AUX3 Support*

The devices COM3 and AUX3, which are described in the MSDOS User's Guide for the SLE, are not supported by this release of SLE MSDOS. Only the standard RS232C port (COM1, AUX) and the first optional RS232C port (COM2, AUX2) are supported.

6.6 *Blink Attributes*

The blink attribute for text characters cannot be disabled at the hardware level. If the blink attribute bit is set for a text character, that character will always blink.

6.7 *Foreground and Background Colors*

In the text modes, characters may not have both a foreground and a background color, with the exception of a black foreground and color background (reverse video). When text characters are displayed with attributes set for both foreground and background color, the background color will be ignored unless the foreground attribute is black.

6.8 *HDSETUP Procedure*

Improper or incomplete preparation of a hard disk unit will produce garbled or incorrect directory listings. Follow the procedures outlined in the MSDOS User's Guide for the SLE, Chapter 4, to insure the proper preparation.

6.9 *FORMAT and SYS Utilities*

In addition to the system files listed in the documentation, the SYS command and the FORMAT command with the /S option also copy the file SLE.SYS to the destination disk. SLE.SYS must be present in the root directory of any SLE MSDOS boot disk. When the /s option is specified, system files are copied from the default disk drive. Before running FORMAT /s with a hard disk as the default drive, make sure that the SLE MSDOS system files are in the root directory.

The FORMAT utility on a single floppy disk drive system will only allow you to format a diskette in drive A:.

6.10 *RETRACT Utility*

The RETRACT utility moves the head on all attached hard disk units to a safe landing zone. Retract may be used effectively with the following restrictions:

1. Any disk access to C: (or D: if present) after a RETRACT will cause the heads of all hard drive units to un-retract to their normal active locations.

2. Using a subdirectory display as part of a PROMPT string (i.e. PROMPT $P $G) will cause the heads to un-retract as MSDOS exits RETRACT and re-displays its prompt. To avoid this, the user may optionally:

   a. Run RETRACT while logged onto a floppy disk drive (A: or B:). RETRACT.COM may be resident on the hard disk.

   b. Set the prompt string back to its simple form by entering "PROMPT" at the DOS prompt prior to running RETRACT. This may be accomplished with a batch file named "RE.BAT: which contains the following commands:

      PROMPT<cr>
      RETRACT<ctrl + z>

      To use this batch file the operator simply enters "RE" at the DOS prompt, and may be logged onto any drive.

6.11 *HDSETUP utility*

A new feature has been added to HDSETUP to avoid trying to boot from a disk which has a newly activated partition. HDSETUP sets the BOOT unit (in CMOS ram) back to its default of STD (Standard) if the current BOOT unit has had any partitions activated. If the current BOOT unit has not had any partitions activated, the BOOT unit information remains unchanged.

6.12 *Interrupt Settings for the SLE Board*

The SLE BOARD is permanently fixed to interrupt the APC III on the INT 2 Interrupt line. No other option boards (i.e. Optional Dual RS-232C, or Joystick/Sound) may use this interrupt or a conflict may result that could destroy system information.

6.13 *8087 Utility*

The 8087 Utility that is supplied with this release of the SLE Product sets the battery-backed-up memory area that is used by both the SLE mode and the specialized mode of the APC III. To avoid conflicts for those applications that monitor the battery-backed-up memory it is recommended that the 8087 Utility also be run when entering the specialized mode for the APC III. This will insure that the applications running under the specialized mode will correctly identify whether or not the 8087 hardware NDP is available.

6.14 *DISKCOPY Utility*

The DISKCOPY utility permits data to be copied between diskettes formatted with 8 or 9 sectors/track. It is recommended that copies be made on diskettes of the same physical format, but it is not mandatory. User's should note that data on copies made from an 8 sectors/track to a 9 sectors/track diskette (or vice versa) is logically intact although DISKCOMP may indicate compare errors, due to the physical differences between the two diskettes.

6.15 *UTILITIES in General*

Utilities distributed with this release of the SLE MSDOS SYSTEM should be used as the documentation indicates to insure their correct operation. Using undocumented command line parameters could cause undesirable results and possible loss of data. It is therefore very important to read the accompanying documentation and to understand the utilities and their options fully before attempting to use them in any way.

6.16 *The Ctrl and Caps Lock Keys*

Pressing and holding the Ctrl key down and then toggling the Caps Lock Key will result in a reversal of the current shift state for the normal keys on the APC III keyboard. If this occurs then simply repeat the operation described above to correct the shift state status.

7.0 Problems Fixed

7.1 *Retract Utility*

When using the RETRACT command on a 20MB hard disk, the heads were not moved all the way to the safe landing zone. The version of RETRACT supplied with this release solves that problem.

APPENDIX

1. Add to Chapter 5 MSDOS User's Guide for the Software Library Expander.

Name	Type
8087	External

Purpose

Provides a software controlled method to indicate the presence or absence of an 8087-2 processor. This indicator is stored in battery-backed memory. This operation is analogous to setting hardware switches in some systems.

Syntax

8087 ON | OFF |?

Comments

8087 ?

Displays a summary of the purpose and operation of the 8087 utility.

8087 ON

Sets the internal indicator to show the presence of the 8087-2. An installed 8087-2 processor is operational regardless of the internal indicator setting. However, some programs may read the indicator setting to determine processing methods.

8087 OFF

Sets the internal indicator to show the absence of the 8087-2.

Documentation Revisions

2. ANSI.SYS (Appendix C)

The documentation for Appendix C, ANSI.SYS, of the MSDOS User's Guide for the Software Library Expander has two

typographical errors.

On page C-9, Erase In Line, the escape code should be:

ESC [K (K is in uppercase)

On page C-11, Reset Mode, the escape sequence should be:

ESC [= # l (lower case 'l', not '1')

3. GW-BASIC Pages

The GW-BASIC Guide for the Software Library Expander contains a typographical error. Pages 1-4, 1-5, and 1-6 were inadvertently placed in an incorrect place. The information on these three pages logically belongs between pages 2-2 and 2-3, in the section COMMAND LINE OPTION SWITCHES.

In APPENDIX E, Keyboard Diagram Scan Codes, three of the Scan Codes are incorrect. For Key Positions 39, 40, and 41, the Scan Codes should be 27, 28, and 29 respectively.

Software Documentation Bulletin

819-095000-356 Rev 04

MS-DOS Operating System **Model No. APC-S103**

1.0 Introduction

MS-DOS is a single-user/single-task Disk Operating System for the APC III computer. The software and documentation contained in this release includes version 2.11 of the MS-DOS operating system and utilities (by Microsoft), the MS-DOS Macro Assembler Package (by Microsoft) revision (004) of the IO system and utilities (by NEC Information Systems) and version 1.3 of the GSX graphics system (by Digital Research, Inc.).

2.0 Contents of the Release

2.1 *Distribution Media* -

DESCRIPTION

MS-DOS System Diskette
Macro Assembler Package Diskette
GSX Driver Diskette
GSX System Diskette

2.2 *Documentation*

DESCRIPTION

MS-DOS System User's Guide
MS-DOS Macro Assembler Manual
MS-DOS Programmer's Reference Manual
Release Bulletin
Function Key Template
GSX-86 User's Guide for MS-DOS

3.0 Hardware / Software Requirements

3.1 *Minimum Hardware Requirements*

APC-H101 - Monochrome APC III with 1 diskette drive

3.2 *Minimum Software Requirements*

None

4.0 Installation Procedures

4.1 Refer to Chapter 2 of the APC III Supplement to MS-DOS User's Guide (S2-6 thru S2-10) for details on installing this release of MS-DOS 2.11.

4.2 Before booting the MS-DOS System for the first time it is advisable to change/replace or add some sections of the distributed documentation. Please refer to the appendix of this release bulletin for the appropriate documentation revisions.

4.3 Use TYPE to view the READ.ME file included on the MS-DOS 2.11 System Diskette. This text file contains additional information that is not incorporated into this release bulletin.

5.0 Enhancements

5.1 Support of 20M hard disks is a standard part of MS-DOS 2.11 for the APC III. The HDSETUP and RETRACT utilities have been enhanced to support 20M hard disks.

5.2 The following printers have been added to the PRINTER utility:

Model	Command Line entry
NEC 8850	NEC8850
NEC Pinwriter P5	p5pinwriter
NEC Color Pinwriter P5	p5colorpinwriter

Note that there are now two Color Pinwriter entries in the menu, Color Pinwriter and Color Pinwriter P5. The Color Pinwriter model should be selected for the CP2 and CP3 models and the Color Pinwriter P5 should be selected for the model CP5 printer.

In addition to the printers listed in the PRINTER utility menu, the NEC Spinwriter c.l.f. 360 (NEC xx30 interface) may be used with the APC III. To designate either of these printers as the PRN device, use the Printer utility to select the parallel port with no parity.

1. The CRTDUMP utility has been enhanced to provide graphic screen dumps to the P5 Pinwriter and the Color Pinwriter P5 in three sizes:

x1 2.2 x 3.5 inches
x2 4.4 x 7.1 inches
x3 6.6 x 10.6 inches

Also, graphic screen dumps for the P2 and P3 Pinwriters are now printed faster and in new sizes:

x1 1.6 x 2.6 inches
x2 3.3 x 5.3 inches
x3 6.6 x 10.6 inches

Graphic dumps to the NEC Color Pinwriters CP2 and CP3 are still possible, but only x2 and x3 are available. Requests for a x1 screen dump to a Color Pinwriter will yield a x2 image.

6.0 Cautions and Restrictions

6.1 Since GWBASIC and the GRAPHIC.SYS installable device driver use the same hardware, output to the GRAPH device from GWBASIC will result in incorrect output to the graphics display memory. GWBASIC may be loaded and used independently of the GRAPHIC.SYS installable driver (GRAPH device) as long as output from GWBASIC is not sent to the GRAPH device.

6.2 The LIB library manager provided with this release does not accept pathnames (files outside the working directory.)

6.3 Some graphics applications may require more than 128K bytes of system RAM. Results are unpredictable when the application size exceeds the available user RAM area of the system. CHKDSK may be used to determine the available RAM area before attempting to load and execute your application.

6.4 The GET TIME function (INT 21H Function 2CH) of MS-DOS always returns 00 for the 1/100's position.

6.5 In general, making ROM Bios calls with undocumented register contents and values can yield unpredictable results. It is therefore recommended that the user/programmer never make ROM Bios calls that do not adhere to the specifications that are documented in the APC III Supplement to MS-DOS Programmer's Reference Guide.

In the most severe cases, making an undocumented ROM Bios call can destroy/crash the MS-DOS Operating System, for example, making ROM Bios call 19H (CRT_IO) with AH = 00H and AL > 09H will crash the MS-DOS Operating system.

6.6 GSX-86 will not function with the TV interface. Any attempt to open a workstation for the console will result in a system hang and the system will have to be booted again.

6.7 When NEC APC III Utilities or the CLS command are to be used the ANSI.SYS device driver must be loaded when the system is booted. Refer to page S1-6 of the APC III Supplement to MS-DOS Programmer's Reference Guide for more details on the ANSI.SYS device driver.

6.8 The switch settings given in the NEC APC III Owner's Guide under "Verifying Switch Settings" are appropriate for initially bringing up the system after unpacking. If the user intends to use the APC III Utilities (i.e. RAMDISK) which use or set values in the battery-backed memory to initialize the system, Switch 1-5, located in the rear of the APC III, must be set to the down (on) position.

6.9 The contents of the RAMDISK will be lost after powering down the system or rebooting using the RESET button (cold boot). The RAMDISK contents will NOT be lost following a warm reboot (FNC + CTRL + BREAK).

6.10 The KEY utility offers maximum flexibility in allowing any keyboard key to be reprogrammed. Note that difficulties can arise when keys are indiscriminately re-mapped. For example, reprogramming the Return key in interactive or command line mode can effectively hang the system, as there will no longer be any way to issue a Return to the system (unless another key has already been remapped to produce a Return).

6.11 When the default screen color has been set to green, selecting a monochrome graphic display mode (modes 5, 6, or 8) results in secret (black) text output on the CRT screen.

6.12 When an NEC utility help screen ('?' parameter) is displayed and a graphics display mode has been previously selected, the help screen is not cleared from the CRT screen as it is in a text mode since the help screens are written directly to the text VRAM. The best way to avoid this problem is to select a text display mode prior to using an NEC utility.

6.13 When using the ROM Bios interrupt calls, programmers should not assume the preservation of any registers.

6.14 After making ROM Bios call INT 19H to set the CRT Display mode it is necessary to delay writing to the text or graphics VRAM for approximately 65 milliseconds for color CRTs and 20 milliseconds for monochrome (black and white) CRTs. This is necessary since the ROM Bios uses the GDC to clear the appropriate memory areas and will return before the GDC has finished its clear operation. When the GDC and the MPU are both accessing the VRAM areas

simultaneously the bus and data become confused and the displayed data may appear garbled or out of place on the screen.

6.15 When using the RESTORE command to restore backed up files to the hard disk, specify the /p option to prevent modified files from automatic replacement. Issuing RESTORE without the /p option restores all specified files regardless of whether or not they have been modified since the back up operation was performed. If /p is specified, RESTORE will prompt the user before replacing a modified file. RESTORE will also display a prompt before restoring a file marked as a read-only, hidden, or system file. This provides the option of preserving updated and special files.

6.16 When a hard disk APC III system is used other APC III option boards must not use INT3.

6.17 The Dual Ported RS-232 (APC H156) option board must not use INT0 for both the "AUX2" and "AUX3" ports simultaneously.

6.18 The CRTDUMP utility and APC III ROM BIOS Printer IO function calls do not support the use of serial printers.

6.19 There are some differences between the standard RS232C port (AUX) and the optional RS232C ports (AUX2 & AUX3) regarding signal states once initialized. AUX will report DSR and CTS low while AUX2 & AUX3 will report DSR and CTS high when initialized. This does not present a problem using the ROM BIOS interface, but should be noted by programmers going directly to the hardware.

ITEMS 20-27 APPLY TO THE OPERATION OF THE GRAPH DEVICE.

6.20 The cursor must be turned off before issuing a clear command. If the cursor is left on then the clear operation will leave traces of graphics on the screen.

6.21 When using the TEXT command, the text string must be terminated by a 00 Hex code or a carriage return (OD hex). When an option follows the TEXT command then the text string must be terminated by a 00 hex code. If the 00n hex terminator is omitted then the GRAPH device will interpret the option as part of the text string.

6.22 When using the GRAPHIC.SYS driver on a monochrome monitor, only color 1 (GREEN) will be visible. All other colors not containing a green component will not be visible.

6.23 Screen option parameters for the LINE, ARC, CIRCLE, RECT, and TEXT commands will change the currently drawn-to screen and not the currently displayed screen. The SET command followed by the SCREEN option will set the currently displayed and drawn to screen to the screen that is specified (0 or 1).

6.24 It is always best to use the proper syntax for commands to the GRAPH device. Use of incorrect syntax may produce undesirable display results or the command may be completely ignored. Always remember that spaces and commas and semicolons are significant and the programmer should carefully construct the commands.

6.25 The JOYSTICK functions are not provided with this release of the GRAPHIC.SYS Installable Driver. No function will result from the use of the JOYSTICK related commands.

6.26 When using MBASIC as the programming language for the GRAPH device it is important to remember that MBASIC will automatically insert carriage returns and line feeds at every 80th column if the line has not been terminated. Opens and Closes should be performed when there is a need to overcome this limitation of MBASIC. The output may also be temporarily written out to a disk file and then copied (COPY command) to the GRAPH device.

6.27 The MOVE and COPY commands always copy and move data in a multiple of 8 pixels nearest the x3 and y3 values. This is due to the byte orientation and structure of the VRAM data.

6.28 The BACKUP and RESTORE utilities operate as described in the APC III Supplement to the MS-DOS User's Guide. Backup and Restore documentation in Chapter 5 of the MS-DOS User's Guide should be ignored.

7.0 Problems Fixed

7.1 When using the RETRACT command on a 20MB hard disk, the heads were not moved all the way to the safe landing zone. The version of RETRACT supplied with this release solves that problem.

7.2 The RESTORE command distributed with the previous release produced a file sequence error when restoring large files spanning 3 or more diskettes. This problem has been resolved. In addition, previous versions of RESTORE using the /P option, incorrectly prompted the user for each portion of a file split across two or more diskettes. In the current version the /P option will prompt the user regarding a read-only or modified file once and handle additional parts of that file accordingly.

7.3 The CRTDUMP.EXE utility has been updated to correct a bug in dumping images to the Color Pinwriters CP2 and CP3. In the previous release, a /x1 or /x3 screen dump produced garbled output on these printers; the utility now functions properly.

APPENDIX

Documentation Revisions

MS-DOS Programmer's Reference Guide page 1-134

Change "3 = Path not found"

to "2 = Path not found" and add
"3 = Invalid path"

MS-DOS User's Guide page 5-15

Change

"[A]2 to "[/A]"

MS-DOS User's Guide:

pages 5-33 and 5-34

Add:

FORMAT /8

When the /8 option is specified for the FORMAT command, the target diskette is formatted for use at 8 sectors per track. Format always creates 9 physical sectors (the default value) on each track, but when the /8 option is specified MS-DOS is instructed to use only 8 sectors. A diskette formatted using the /8 option will have a total of only 322,560 bytes available for use, while a diskette formatted for 9 sectors/track usage will have 362,496 bytes available.

MS-DOS User's Guide page 6-4

Delete

"<CONTROL Z Puts a CONTROL-Z (1AH) end-of-file character in the new template"

Insert before "<NEWLINE>"

"<REPLACE> Turns insert mode off; this is the default"

Supplement to the MS-DOS Programmer's Reference Guide page SE-11

Change "bit 6:Interrupt reset" to "bit 6:Internal reset"
and "bit 4:Error request" to "bit 4:Error reset"

Supplement to the MS-DOS Programmer's Reference Guide page SE-18

Change "bit 6:Interrupt reset" to "bit 6:Internal reset"
and "bit 4:Error request" to "bit 4:Error reset"

MS-DOS Programmer's Reference Guide page 1-14

Change	"Hex"	To	"Hex"
	"00H"		"00H"
	"01H"		"01H"
	"08H"		"09H"
	"0BH"		"0CH"
	"0DH"		"0EH"
	"0FH"		"10H"
	"13H"		"14H"
	"15H"		"16H"
	"17H"		"18H"
	"1FH"		"20H"
	"20H"		"21H"

MS-DOS Programmer's Reference Guide page 1-44

Replace

"If DL = FFH before call, then zero flag set means AL has character from keyboard. Zero flag not set means there was not a character to get, and Al = 0"

with

"If DL = FFH before call, then zero flag not set means AL has character from keyboard. Zero flag set means there was not a character to get, and AL = 0"

Supplement to MS-DOS Programmer's Reference Guide pg SJ-6.

Add the following description of the DMODE command between the cursor and ERASE commands.

The DMODE spec below has been added to the options of the drawing commands and the SET command. Using DMODE_1 as an option parameter allows drawing in "rubber-banding" mode since the pixels that intersect are exclusively or'ed together istead of overwritten or replaced. Replace mode is selected as the default drawing mode.

DMODE_[0 | 1 | 2 | 3]

where:

0 = Replace Mode
1 = Xor Mode
2 = Clear Mode
3 = Set to '1' Mode

The DMODE Spec may be used with any of the following commands as an option

CIRCLE
LINE
RECT
ARC
SET

Supplement to MS-DOS Programmer's Reference Guide Pg SJ-6.

Add the following description of the FMODE command between the FILL and INIT commands.

The FMODE Spec shown below has been added to the option parameters for the FILL command and the SET command of the GRAPHIC.SYS driver. If it is desirable to fill an area faster by sarificing "island searching" then use FMODE_128. Island searching refers to the ability to fill around areas of the same border color within an area that is already being filled. If island searching is eliminated filling proceeds faster but all areas within the filled area will be overwritten by the new fill color. To fill slower but allowing island searching, use FMODE_0.

FMODE_[0 | 128]

where:

0 = Fill area slower but fill around islands
128 = Fill area faster but fill over any islands

Supplement to MS-DOS Programmer's Reference Guide Pg SA-12

Change "0,1,0,0,0: Color Pinwriter
0,1,0,0,1: reserved"

to "0,1,0,0,0: Color Pinwriter
0,1,0,0,1: P5
0,1,0,1,0: Color Pinwriter P5
0,1,0,1,1: 8850
0,1,1,0,0: reserved"

Page SE-17

After "Hard disk type on sense command to hard disk

01 - 10 MB hard disk"

Add "11 - 20 MB hard disk"